MAXIMUM POWER COMPUTING
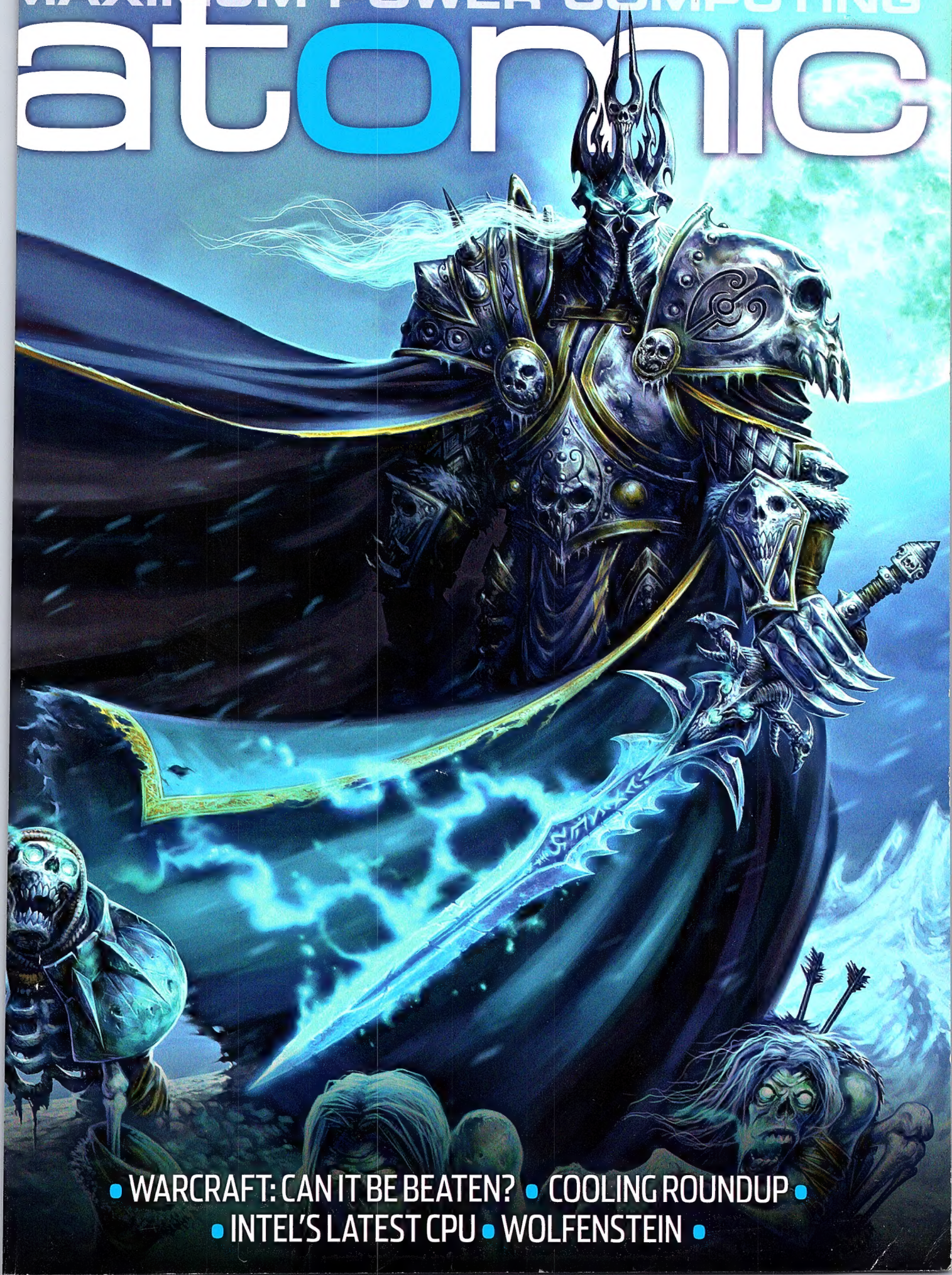# atomic

- WARCRAFT: CAN IT BE BEATEN? • COOLING ROUNDUP •
- INTEL'S LATEST CPU • WOLFENSTEIN •

OUT OF THIS WORLD

P193

Motherboard Support	Up to Standard ATX
Expansion Slots	7
Drive Bays	4 x 5.25" Ext, 1 x 3.5" Ext, 6 x 3.5" Int
Cooling System	1 rear 120mm x 25mm exhaust TriCool™ fan 2 top 140mm x 25mm exhaust TriCool™ fan 1 side 200mm fan for graphics cards
I / O ports	2 x USB 2.0 / 1 x eSATA / 1 x Audio Set (AC'97/HD)
Dimensions (mm)	514 mm (H) x 205 mm (W) x 590 mm (D)

P183

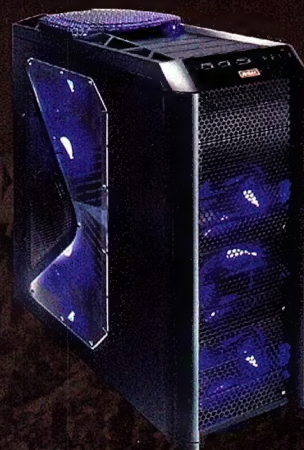|	
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EDHEAD

Wow.

Blizzard Entertainment, as you may remember, came in number one in our top ten list of games developers during the recent reader-voted Atomic Hot 100. And with good reason, too. The company may not release in volume, but it sure does release in quality.

Then again, it's easy to look at the big title games and think Blizzard sits back and just watches the money roll in, especially with a run-away success of a game like World of Warcraft. It's a game that deserves praise, but 12 million subscribers' worth? For just one game?

Well, that's really a mistaken attitude right there. Blizzard doesn't ever finish a game – the company patches, updates and fine-tunes every title it releases long after release. As recently as March this year devs were looking for feedback on an upcoming patch to Diablo 2; and don't even get me started on the constant streams of tweaks the classic Starcraft has received in its long and Zerg-infested lifespan.

And WoW makes those games look like a cake-walk when it comes to support. We're talking serious big-iron server time to keep Warcraft up and running, legions of tech support staff and in-game GMs. Constant monitoring for spammers, gold farmers and worse. And that's before you even get into the incremental patches that each add new content, refine game mechanics, and keep improving on what is already a bloody deep game. Deep? Try bottomless.

So this issue we're looking into what keeps WoW on top; how that attention to detail works in their favour, and how WoW has impacted on the rest of the MMO market. We've spoken to MMO luminaries from Funcom, Turbine and more to find out what they've learnt from their own experience in the genre, and why they think Blizz is going to be hard to beat for some time yet.

Oh, and next month, keep an eye out for an Aussie first look at one of Blizzard's most exciting upcoming games in the second part of our two-part Blizzard special. We're about to get some hands-on time with the game, and we'll be sharing all the juicy action from the most anticipated RTS of this decade.

See you then!

David Hollingworth
dhollingworth@atomicmpc.com.au

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ISSUE

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Terminator: Salvation PC game recalled

Once again, the PC becomes the poor cousin no one really cares about as faulty
Terminator: Salvation games roll out to stores.

The movie tie-in game for Terminator: Salvation has hit the shelves, and already it's proving a less than stellar performer.

This time the problem is that while the PS3 and 360 versions of the game play fine (well, as fine as they can - see our review), the PC version is riddled with bugs and nigh on impossible to install thanks to CD replication issues. Here's the word from the official forums:

"We have recalled all PC copies of Terminator Salvation from retail in North America and are currently in the process of replicating new copies. The new copies will be on store shelves in a few days. A replacement plan for all end users that purchased the defective units is currently being set up. Details to get a replacement copy will be announced shortly."

Digital distribution seems unaffected, however, so if you bought the game on Steam you should be cool.
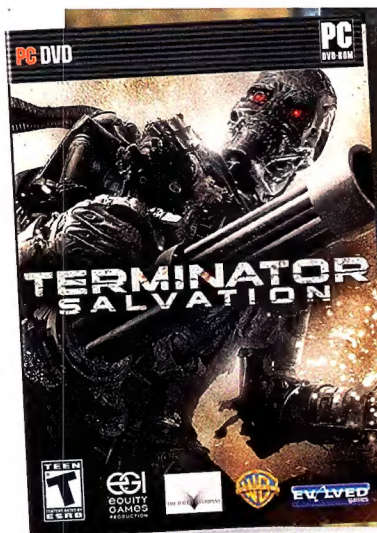
Fallout 3 news galore!

DLC to come to PS3 at last, while more Fallout 3 content announced for the near future.

Can you ever get enough Fallout 3? The overwhelming consensus (despite some bugs in Games For Windows Live's downloading process and some server issues) is that the answer to that question is a resounding NO.

So there's even more coming, and to the PS3 as well.

Following some serious brain-time getting the DLC implementation to work over the Playstation Network, we should see Operation: Anchorage released for PS3 in late June, followed by The Pitt and Broken Steel 4-6 weeks apart.

What's more, there are two whole new expansion packs just announced. Point Lookout lets players explore a massive new swampland area filled with new quests and content. In Mothership Zeta the aliens have returned! Experience an alien abduction first hand and find out if you're tough enough to survive.

Both games will cost 800 MS Points, be available on PC and 360 initially, and will be released in late June and July respectively.

Finally, for those who cannot be arsed with all this DLC malarkey, there are three new retail packages just announced.

Fallout 3 Game Add-on Pack #1 includes The Pitt and Operation: Anchorage on a disc and will be available for Xbox 360 and PC on June 12th.

Fallout 3 Game Add-on Pack #2 includes Broken Steel and Point Lookout on a disc and will be available for Xbox 360 and PC in August.

A Fallout 3 Game of the Year edition will be available in October.

Looks like this game's going to own a piece of my soul for time yet. Keen.

Assassin's Creed 2

The latest screens from this year's sequel to the ultimate free-running title.

W hen the end of the year rolls around we'll be running around the elegant and civilised streets of Venice, engaging in all manner of athletics and enjoying an array of all new fight moves and killing combos.

In other words, we'll be playing the brand new Assassin's Creed 2.

The game is set in rennaisance Venice, following a new assassin as he negotiates the complex politics of the time. He'll have an array of new killing tools at his disposal, and no doubt an interesting B-plot that we haven't even heard of yet.

For more info, see the official site at **http://assassinscreed.uk.ubi.com**

ANNO 1404

Discover and master the wondrous ways of the Orient to build and nurture monumental metropolises across a massive islands world

DOWNLOAD THE DEMO TODAY!

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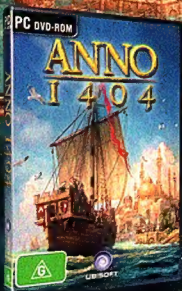
Available on June 25th
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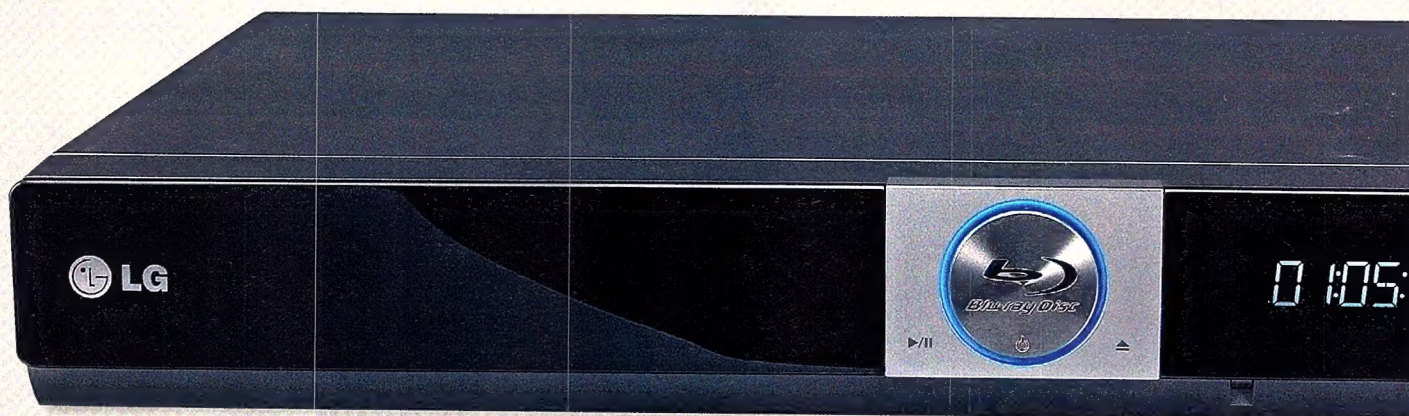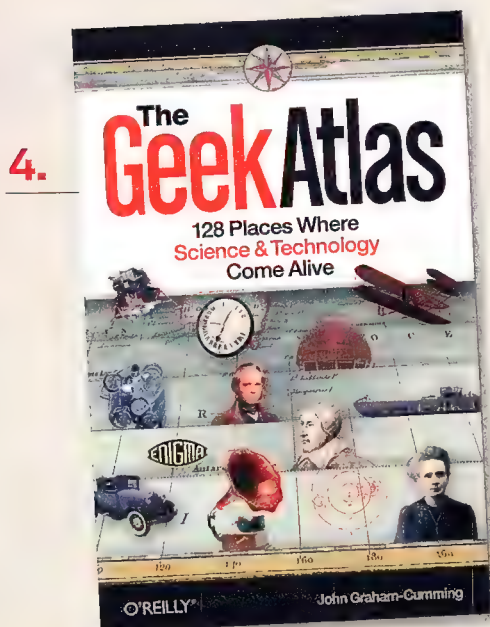
1. Bluetek Multi Charger

Price $50 Website www.bluetek.com.au

You know what really makes us cranky? The useless proliferation of proprietary charging cables, meaning that the modern 'switched on' and 'mobile' tech 'enthusiast' must carry around a veritable army of chargers, power bricks and crap. Why can't they all just get along and use the one bloody adapter?!

Well, if you're angry like we are, rejoice, for bluetek's Multi Charger is your new God. It can pump juice to iPods, Nokia phones, a mess of digital cameras, PSPs and all kinds of stuff, either from the wall or from a USB connection. Handiness, thy name is bluetek.

PS: we are also mildly cranky at Third World debt.

2. Roaming Studio modding accessories

Price from $9.99 Website www.roamingstudio.com.au

There's nothing that says 'hardcore' quite like a flaming skull. In tattoos, album covers and leather jackets, it's one of the ultimate indicators of bad-ass-ery.

And now you can have them – and many more neat designs – on your PC case.

Roaming Studios handcrafts a range of embossed designs for PC modders, including the aforementioned skull, and many more besides. They come pre-painted or you can paint them yourself. They may not be for everyone, but we can really see some of these adding a certain something to the right mod design. The curved dragon, for instance, would look really neat on a case window; the range of plain skulls could really lift a metal-themed mod to rocking heights.

Hmm, I feel a Warhammer 40k mod coming on...

3. Hypermac

Price from $US199 Website www.hyperdrive.com

If you're the kind of person who foams at the mouth (and not in a good way) at the very thought of Mac hardware, you might want to skip ahead to the next bit of kit. But if you don't mind the odd bit of fruity hardware, especially of the more mobile variety, then the Hypermac charger might be just what you're after.

There are four different sized chargers, and they're ideal for keeping a Mac lappie or even an iPhone charged up on the go – it's essentially a second, external battery. They're styled to match Mac hardware (you know, sleek and white and silvery – which is what I imagine Steve Jobs' skeleton looks like), they power your device while charging it, and can deliver up to 32 hours of extra use. Perfect for long haul flights or epic pr0n sessions on the open road.

What?!

4. The Geek Atlas

Price $US29.99 Website http://oreilly.com

The O'Reilly books, on everything from The Manga Guide to Electricity to endless books on coding and programming, are renowned for being some of the best tech guides in the business. And, at times, a little quirky – but always useful.

The Geek Atlas hits both the quirk quotient and usefulness dead on. It's a travellers' guide to great and famous landmarks in tech, computing and scientific discoveries from all over the world. Want to check out Foucault's Pendulum? Or see a descendant of Newton's famous apple tree? This book has you covered.

5. LG BD370 Blu-ray player

Price $449 Website www.lg.com.au

Until we got our hands on one of these puppies, we hadn't really caught up properly with the HD revolution. Now, however, we're hooked. Addicted. Spending money that should be going on rent and food on replacing movies in our collection with Blu-ray versions.

It's kind of sad, really.

But hey, we're entertained, and what's more, this new player from LG is net-connected and lets you browse and play YouTube videos on your telly! As a frequent social YouTube user (it's like being a social drinker – same amount of giggles, too), this is just damned handy. And can watching Washington or the GI Joe PSAs on your TV ever get old? We don't think so.

And if you want some technical details the player supports BD Profile 2.0 for BD-Live content, HDMI 1.3, 1080p up scaling for DVDs and lossless 7.1 audio. Now to go watch Serenity again...

3.

4.

The GeekAtlas
128 Places Where
Science & Technology
Come Alive
O'REILLY
John Graham-Cumming

5.
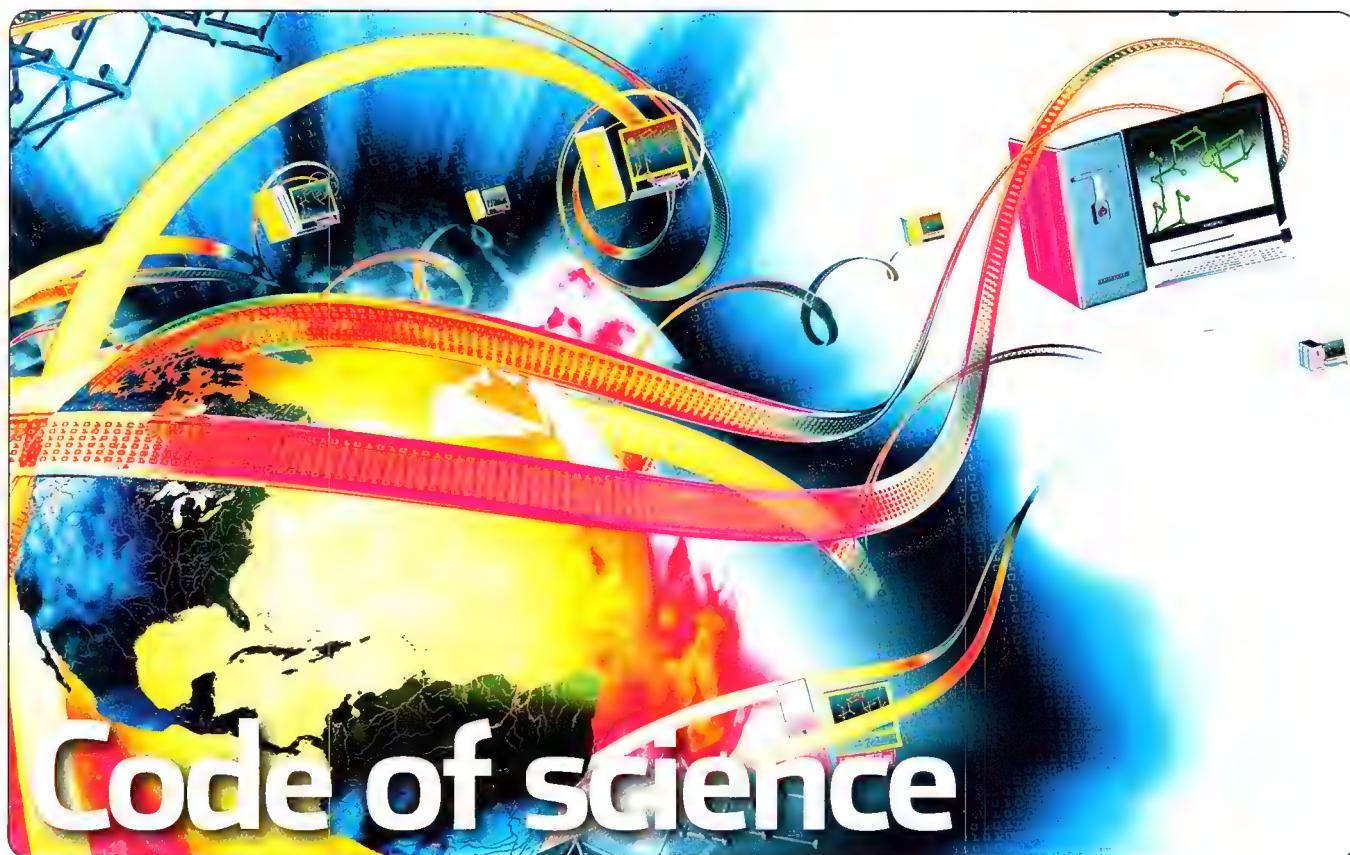
Code of science

It's the most powerful supercomputer on the planet – a worldwide network of PCs dedicated to researching the mysteries of protein folding. **Ben Hardwidge** breaks down Folding@home while **Ashton Mills** is on sabbatical.

There's a table of the world's most powerful supercomputers, and IBM's Roadrunner supercomputer is currently on top of the **www.top500.org chart**. With 129,600 cores, the mammoth machine has a quoted number-crunching rate of 1.46 petaflops. This is incredible stuff, especially when you consider that most of us haven't really thought about anything in terms of petaflops before. However, even Roadrunner looks decidedly weedy compared with the power of Stanford's Folding@home project. Its computational power has now surpassed the five petaflops mark.

Comprising a huge network of Internet-connected PCs, Folding@home is really the world's most powerful supercomputer. You may well have crunched through a few work units for Folding@home, and you probably know that it benefits medical research. But what exactly is its purpose, and has it produced any worthwhile results?

What is a protein?

Let's start with the science behind Folding@home, which is protein folding. In simple terms, a protein starts out as a long string of amino acids, but it can't perform its biological function until this string is transformed into a three-dimensional shape. This transformation is called folding, and

once the protein has folded, it can then perform its biological function.

However, proteins can also misfold and take on a different three-dimensional structure. A simple example of this can be seen when cooking an egg. Crack an egg into a pan, and you can see the proteins of the egg white in their natural runny state. As you apply heat to

them, the proteins start to unfold. After this, the amino acids from the different proteins that comprise the egg white will then mix, causing the egg white to change texture and become solid. However, proteins changing like this inside the body can have drastic consequences, particularly as the process is, as in the case of frying an egg, often irreversible.

A scientist who has been researching protein folding for many decades is Professor Harold A Scheraga, based at Cornell University near New York. "There are genetic diseases," explains Scheraga, "in which a particular amino acid

might have been mutated to another one. That will change the interactions between the different parts. Because one amino acid is different, it doesn't fold into the proper form, so it doesn't perform its biological function.

"Sickle Cell Anaemia is a good example of that. One particular amino acid is changed, and the haemoglobin - that's a protein in the red blood

As Scheraga points out, this is just one example of a situation where misfolding leads to diseases.

cell that binds oxygen - starts to aggregate one molecule with another to form a big glob instead of folding properly. It distorts the structure of the red blood cell into the form of a sickle. Since haemoglobin has to bind oxygen in an un-deformed red blood cell, and carry it around in the blood, the red blood cell isn't functioning well, so somebody who has that disease won't get enough oxygen."

As Scheraga points out, this is just one example of a situation where misfolding leads to diseases. Another prominent misfolding disease is Alzheimer's, which also results from proteins

misfolding and aggregating with other molecules to form big globs. "In Alzheimer's, the misfolding forms big clumps in the brain," says Scheraga.

Studying how and why proteins misfold has been a major challenge for medical research scientists for decades, and Scheraga used some of the early forms of computational modelling of the process. "I was one of those who started the field," says Scheraga. "We had limited computer time, and we could work with small chains. What is small? Five amino acids, and then we got up to ten and so on."

Scheraga now has his own supercomputer in his lab, featuring 800 CPUs, and his colleagues have now developed the code to calculate the total energy of a string of up to 1,000 amino acids. This is a lot of computer power, but it's still not enough. He has to apply for additional CPU time at national computing centres in the USA and even in Germany.

Distributed computing

As you can see, simulating protein folding demands a colossal amount of computer time, even on large-scale supercomputers. However, Scheraga points out that this is "the problem that Vijay Pande has solved" with the Folding@home project. By using the spare clock cycles of CPUs and GPUs on Internet-connected computers all over the world, Folding@home now has a tremendous amount of processing power. It's a concept that's commonly known as distributed computing, and it's perhaps most well known from SETI@home, which uses distributed computing power to look for aliens.

Scheraga doesn't use Folding@home for his own work, but this is mainly because he likes to have control over the process. "I just don't know how my code will function on other computers," he says. "I've collaborated with lots of people in my years in science, and I've always found that such collaborations don't lead to results in a reasonable amount of time."

Pande says that some work units get close to performing the whole folding process of a very fast protein on the GPU client.

What's in a work unit?

So what's actually in a Folding@home work unit? The work varies massively between work units, but your computer will usually only carry out a very small part of a folding process. In fact, the founder and director of Stanford's Folding@home project, Vijay Pande told us that a CPU client with a slower protein might only calculate "one millionth of the process".

When we talk about the speed of a protein, we're simply talking about the time that a protein takes to fold. Pande points out that proteins fold on a timescale measured in microseconds or milliseconds, and that a Folding@home work unit could represent "somewhere between

a nanosecond and a microsecond of overall dynamics". As such, Pande says that a work unit processed by the GPU client "could get close to folding a whole process on a very fast protein".

Does Folding@home work?

It's worth noting that the concept of having this level of processing power available for protein folding was unprecedented until Folding@home started in 2000, and computational protein simulation was then (and still is) a new science. How could Stanford prove that it could yield reliable and useful data? As any medical expert will tell you, the key to proving your research is often found in double-blind tests. In a medical trial, for example, a double-blind test would mean that neither the patient nor the person administering the drug know whether the patient was being given a placebo or the genuine medicine.

This is what Folding@home needed to prove to the scientific community, and Martin Gruebele, professor of chemistry, physics, biophysics and computational biology at the University of Illinois, was happy to be the other "blind" partner. Gruebele had a research lab for experimental protein folding tests, so he and Pande could see how both computational and experimental results compared.

"Vijay and I happened to attend the same conference at an American Chemical Society meeting," Gruebele explains, "and he was just getting his Folding@home computer system running, so we said let's do a double-blind study - we're not going to tell you the experimental numbers, and you're not going to tell us what results you're getting from the simulation. Let's run both projects for a while in parallel, and see how they compare."
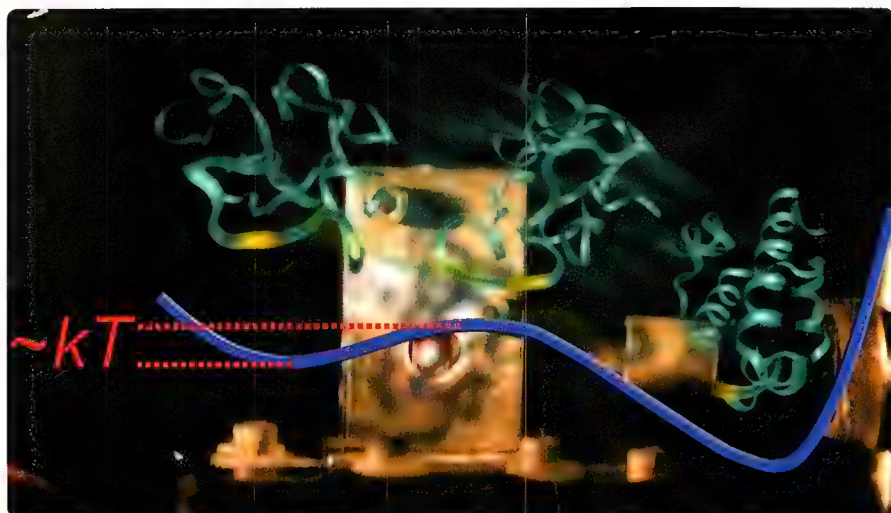
This composite image shows an experimental cell holding proteins during a fast folding measurement (the metallic block with a hole in the centre), and a protein structure folding nearly 'downhill' from left to right. The blue energy curve shows that the folded state is lower in energy than the unfolded state. Gruebele is studying the impact of pressure on this protein, and is in talks with Pande about simulating this pressure using Folding@home.

The villin headpiece is a small, 36-residue alpha helical protein. It has been heavily studied experimentally and by simulation since it's one of the smallest, fastest folding proteins. It has a hydrophobic core made of three phenylalanines, but also has two groups (a tryptophan and another phenylalanine) which are hydrophobic, but are solvent exposed (for functional reasons). Duan and Kollman simulated one microsecond of MD time, in a groundbreaking simulation.

Gruebele points out that the term 'double-blind' should be in quotation marks, as there were no rigorous controls on the procedure, but neither scientist honestly knew the other's results until they were compared. The protein used for the test was based on an artificial protein designed by Barbara Imperiali's research group at the Massachusetts Institute of Technology. Called BBA (one of a series of proteins called BBA, BBB, BBC and so on), the protein formed a part of what's known as a zinc finger.

"We looked at these sequences and decided that one of them could be a very good small protein for a direct comparison between computer simulation and folding," says Gruebele, "because it's very small, it might fold quickly." Gruebele's lab also decided to add tryptophan to the protein to make it fluoresce under the lasers in the experimental lab. As the abbreviation for tryptophan is W, the protein used in the test was called BBAW.

Pande and Gruebele then set out with the goal of finding how long it would take the BBAW protein to unfold after a jump in temperature, as might occur if it was present in someone with a fever. This would be hard for Folding@home, as accurately measuring the time it takes a protein to fold had been a tough challenge for computers until that point.

Gruebele explains that back then "people were incredibly happy when their computer just ran one trajectory". He points out that the problem with this was that "if you run just one single simulation and watch it fold, one of several things might happen - it might not fold at all, because you can't run it for long enough, or it might fold to an incorrect structure because your computer force field isn't accurate enough, or it might fold after a specific amount of time, such as five microseconds."

As Gruebele says, this doesn't actually tell you how fast the protein will fold in real life. "When you repeat this," he explains, "different proteins will take different amounts of time - some slower

and some faster, and if you only have one computer observation, you don't know whether that five microseconds is just one of the lucky ones that folds really fast."

This is where the power of Folding@home proved itself. Using six months of computer time on Folding@home, Pande was able to run thousands of simulations, and then analyse the

speed of the dozen or so proteins that successfully folded. Some were slower or faster than others, but Gruebele explains that "by knowing how many trajectories he [Pande] had run, and what fraction of them had folded, he was able to extract an accurate folding time for the simulation."

Gruebele adds the disclaimer that this doesn't mean that the time he got from the simulation was an accurate measurement, but at least he was actually able to get a time. That's what he was able to do that people had not been able to do before - predict that this protein will take X microseconds plus or minus.

Meanwhile, Gruebele and his team at Illinois performed their experimental measurements, and the two teams then compared their results, which turned out to be surprisingly close. "To be honest," says Gruebele, "it was even closer than I would have ever thought." Folding@home had proved that it could accurately simulate protein folding, with results that could be verified by traditional experimental testing. A paper called 'Absolute comparison of simulated and experimental protein-folding dynamics' detailed the tests, and was published in Nature in 2002.

Gruebele and Pande have stayed in touch since, and Gruebele says he's now in talks with Stanford about using Folding@home to perform

computational simulations of how proteins fold when put under pressure. Similar collaborations with other experimental researchers have also been performed since, while others are also in the process of being verified. There's a full page of 63 result papers on Stanford's website at **http://folding.stanford.edu/English/Papers**, but Pande also says there are some interesting discoveries that haven't been published.

Pande describes a recent test carried out by Brian Dyer from the Los Alamos National Laboratory in 2008 that was similar to the Gruebele blind test. The findings haven"t been published, but Pande says that they"ve been publicly discussed, and that Dyer "showed that many of the predictions that we made are bearing out to be verified in his most recent experiments". However, there are also some potentially very exciting results from collaborations with experimental labs that have yet to be publicly disclosed.

In less than a decade, Folding@home has been through its teething phase as a small start-up project that needed to be proved and tested, and has now moved on to be useful for medical science. "That's the part I'm probably most excited about," says Pande, "because the work that Grubele and Dyer do are very important for validation of the general technique, but our real goal is to make an impact on something like Alzheimer's."

Good luck, guys. Good luck.

... Gruebele says he's now in talks with Stanford about using Folding@home to perform other computational simulations...
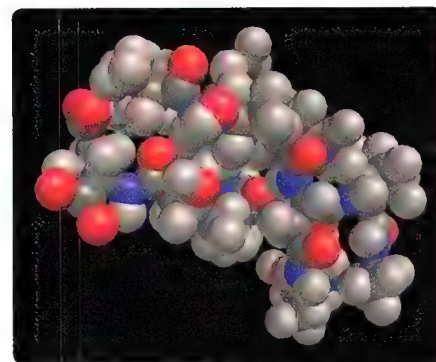
You don't necessarily need the SMP client or GPU client to help the project. The initial work for Stanford's paper on Alzheimer's was performed only using the classic client, simply because so many people use it and that way they could get a large range of results.

INPUTOUTPUT

Dan Rutter brings the answers to
your questions like no-one else can.

I/O OF THE MONTH

Add enough farads and you won't need mains at all

I I have a new ATX 2.3 power supply rated at 500W, which has a max recommended draw of 431W, and no power-factor correction. Can I pull apart my old quality Antec 430W (rated at 430W max power) and connect pieces to the new one (capacitors and such) to improve PF and 'cleanliness' of the output?

Chris Kamppi

O In theory, yes. In practice, no. Patching PFC onto a power supply is less than straightforward, and not particularly desirable anyway. A PC with a power factor of 0.7 will do no real harm to anything else in your house, and home and small-office electricity consumers aren't billed by power factor. (More about this confusing subject at **www.dansdata.com/gz028.htm**.)

Adding simple parallel capacitance to the outputs of a cheap PSU is a great deal easier, and may have a real effect on system stability if you're riding the ragged edge of the cheap PSU's capabilities. The more sensible solution is, of course, to just get a better PSU, but where's the fun in that?

In practice, though, the fact that you are asking this question very probably means that you have inadequate experience to be able to hack power supplies effectively, or safely. Power-supply design is a surprisingly complex field, and there are several ways in which you can dramatically shorten your life by messing around with

mains-powered equipment.

This doesn't mean you're never going to be able to dabble in this field, or even become an expert; it just means that you need to work your way up to the appropriate knowledge. Building, and understanding, electronic kits is a good start, but I also think the Sci. Electronics.Repair FAQ, **www.repairfaq.org**, is an excellent jumping-off point. Read any section that grabs your interest, and whenever you hit a concept you don't understand, use that to guide further study.

I/O OTM
WINS A LOGITECH G5!
There's a mouse in the house. Okay, it's not in the house, it's in I/O. And it looks damn good.

This is going to be the GREATEST PSU EVER!

Or you could try a VT100 terminal

I I run a KVM (a Belkin Flip) at work to switch between the computer my place of employment provided for me and the computer I own and use for entirely appropriate things which are not, in any way, gaming/entertainment related whatsoever.

Attached to said KVM is a Bluetooth dongle, which connects to a spare Logitech diNovo MediaPad (don't ask).

This MediaPad alerts me every time a work-related email comes in, if I am using the work PC, or... tells me Artist/Track Names if I am using the 'other PC not used for entertainment'.

When I boot the work PC at the beginning of the day it automatically connects to the MediaPad and displays any new email, however every time I switch the KVM, I have to reconnect the MediaPad via the Bluetooth icon in the system tray.

Considering I am switching PCs often during the day this is... annoying.

Is there any way to enable the Pad to automatically connect to the appropriate computer once I switch inputs via the KVM? Or do I have to continue going through the rigmarole of "Enter your Pass Key now"?

Alex Glissan

O Fortunately for Alex's chance of getting a reply from me, this has relevance beyond this one special application. Lots of people use Keyboard-Video-Mouse (KVM) switches, and Bluetooth gadgets, like headsets. There's a surprising number of different combinations of computers, monitors and input devices out there, and quick and painless Bluetooth re-pairing could be a handy part of the puzzle.

If you can turn off encryption for the diNovo keypad's Bluetooth connection – or any other device you want to automatically connect

16

– then you'll still have to click, but at least won't have to type. (There are also 'no-passkey' Bluetooth devices, like cheap mice; sometimes you can connect to those without typing a passkey, sometimes you have to use a passkey of 1234 or 0000, and sometimes they won't actually connect at all.)

To make the connection truly automatic, though, you need the computers to be able to tell when you've switched from one to the other. But KVMs make every computer connected to them think that it's always got a mouse and keyboard connected, even when the actual monitor, mouse and keyboard are connected to a different computer. If you want something to happen every time you switch, there's no way for any computer to tell whether it's currently the one you've selected on the KVM, at least until it starts receiving keyboard and/or mouse input.

So that could be the path to a solution, if there's one to be found. You need a snippet of Visual Basic or something that tries to pair with the appropriate Bluetooth device whenever the PC starts receiving input after a pause of, say, 60 seconds, and is not paired to that device already. This won't actually help much if you can't disable encryption for the diNovo keypad thing, though; it'll just automatically bring up the box that makes you type the passkey.

(Count your blessings: Some people end up with a Bluetooth keyboard that has to be re-paired every time they reboot, and requires them to type in a passkey. With their other keyboard.)

You might also be able to find a curly solution having to do with making the computer think the Bluetooth device went to sleep and then woke up again, but I don't like your chances. I shall also refrain from giving you You're Doing It Wrong suggestions involving VNC or Remote Desktop or something instead of the KVM. You might find a use for the free, cross-platform app 'Synergy', **synergy2.sourceforge.net**, though; it lets networked computers each keep their own monitor, and you choose which computer you want to use by moving your mouse pointer from one screen to the next.

It's probably possible to find a KVM that actually does have a utility, or at least an SDK, that lets you make things happen when you switch. Unfortunately, devices like that often live in Corporate Procurement Land where a pack of four AA batteries costs $25. (But comes with 24/7 phone support!)

By pressing down a special key, it plays a little melody!

It is PERFECTLY NORMAL to be this picky about keyboards

I was shopping for clicky keyboards from a business that would take PayPal (which unfortunately rules out Unicomp) and came across a unit from 'ABS Computer Technologies': **tinyurl.com/dz6o5k**

The ridiculous crap like the gold-plated USB cable providing 'lower latency' aside, it appears that the unit uses a different design for its keyswitch. I'm somewhat familiar with the buckling-spring keyswitch diagram I've seen when looking at IBM Model M 'boards, and this one appears to use a little lever of some sort as the resistance, rather than the buckling spring. I assume this is to avoid paying a royalty on the existing Model M design or some such. Have you heard of this brand/design?

I realise I could get more tried/true units on eBay, but I just can't bring myself to trust the sellers there, and it's a pain to post feedback, etc.

Jon H
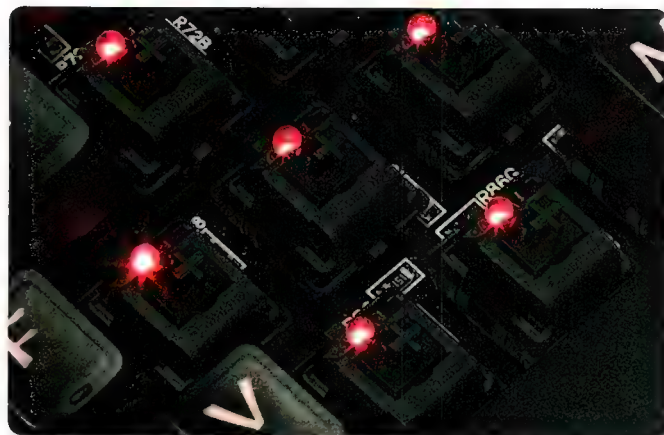
The ABS M1 is just a keyboard using Alps keyswitches, which along with Cherry switches are actually the most common 'clicky' technology. Only IBM and their associates made buckling-spring keyboards, but many keyboards use Alps switches.

From the picture, this looks like a slightly-marked-up Scorpius M1, which was also rebadged as the version 2 'Das Keyboard'. I wrote about it and the current Das models here: **tinyurl.com/6zhsyl**

Great Mysteries of the Computer World

I'm looking at buying a Drobo, and the one thing which bugs me about it is the external power brick. They're a pain in the arse and messy and ugly and another damn thing to trip over. Why don't external drive enclosure manufacturers include an internal multi-voltage power supply and some kind of IEC lead? So much neater!

Why yes, the Drobo will be connecting to a Mac - how did you know?

Robert Atkins

Now that world-compatible switchmode power supplies are commonplace, there's really not much of an excuse for this, is there?

I can think of a few reasons why built-in power supplies are unattractive for a lot of external storage boxes:

1. Power supplies make heat, and external drives often run pretty hot anyway, because they have poky little cooling fans, if any fan at all. The usual lump-in-a-wire power brick doesn't have active cooling either, of course, but just putting it in a separate case gives a lot more cooling surface area than you'd get if you built the PSU into the drive box.

2. There's no room for a power supply in really slimline drive enclosures.

3: Many external drives won't survive much of a fall – laptop drives are pretty tough, but 3.5in devices aren't. If, therefore, you have a reasonably stiff mains cable hooked up to the back of the box, it's more likely that the weight and inflexibility of the cable will encourage the drive to fall over, slide off the desk, et cetera.

4. World-compatible power supplies may be common, but if you don't have a given country's electricity-authority approval for the PSU you've built into your product, you will either have to pay relatively big bucks to get the PSU approved, or install a different one for each market where this problem exists. If your drive box just runs from a 12VDC barrel plug, though, you can easily get your distributors in each country to bundle appropriate external PSUs with the product.

5. If a power supply fails, it's much easier to replace a plugpack than an internal PSU. If some ordinary consumer makes a warranty claim for a dead plugpack, you can just send them a new one, not ship the whole drive box back to you, get a tech to open the case, et cetera.

For large fancy storage boxes like the Drobo, though, some of the above problems are irrelevant and the others shouldn't be a very big deal. You really would think there'd just be an IEC socket on the back. But whaddayagonnado.

The next level

Ashton Mills talks modding and the future of the games industry.

User content. It's a phrase not often heard among game developers per se, more in the communities of those who play the games. A colloquial term for it is modding, but that belies what is essentially a gameplay experience born of other people, other gamers, just like you.

Which means on the whole, you get a bit of variety – that is to say, content that often wouldn't pass the mild musings of anyone with their eyes open. But at the same time there's plenty of content which is up to par with the original developers and, in some cases, surpasses it.

unofficial downloadable content, unendorsed gameplay expansions, and sometimes unimaginable in volume. My old Oblivion install was a few GBs at the start. It pushed more than thirty by the time mods had come and gone.

And so with user content so pivotal for some games (it's not an option for those developers that don't release toolkits, and the console platform users have no power either), and with the market starting to stagnate as it is with clone after clone of games in each genre, I'm kinda hoping someone at the top will start to see the next big thing in game development will be harnessing this

already been included. The experience would (and knowing now after the fact as we do, does) surpass anything Bethesda could ever create.

At the very least, extensions like DLCs (paid downloadable content, often not worth the asking price) could be built from directed user content instead, the support of which alone would increase sales of the original game just so talented modders could see their work professionally endorsed.

The passion that made Counter Strike and Portal can't be artificially manufactured, but it *can* be harnessed.

And the first developer to get this right is going to change the industry forever.

... I'm kinda hoping someone at the top will start to see the next big thing in game development will be harnessing this resource.

Which is why user content is critical for the longevity of a title – there are gamers who have purchased Fallout 3 because they knew it would be modded, knew there would users like you and I making mods to extend the game. While Bethesda has some neat legalese which basically says they have rights to anything you make using their toolkits, so you can't really go round selling it for profit, they're still supporting the longevity of their game without having to lift a finger.

And of course, there is no greater example of this than Counter Strike, Team Fortress 2 and Portal. These are Valve titles, it's worth remembering, that started as mods, as the ideas and work of a couple of gamers sitting at home. User content equals increased sales of the game itself.

But I digress – getting back to what it is at the core, user content is part of the gameplay experience you get when you buy the game. It's

resource. In some ways, MMOs do this already by nature – afterall, they are empty worlds without the other players. The other players don't make the content, they *are* the content.

When it comes it shouldn't be through some legalese wrapped, creativity-sucking process where publishers pull user content as means of saving money, but more as the developers working with and tapping the rich and diverse creative power of the community of gamers at large. Keep the market free, let people create, and use a process to allow submissions and divine the best user made content. A system whereby modders are compensated would ensure active interest and reward creativity, and whatever it costs the developers in this process, the rewards of increased sales from a far more fleshed out game world will easily be worth the investment.

Imagine if the first Oblivion or Fallout 3 you played was the one after all the best mods had

Ashton Mills knows his way around a mod.
amills@atomicmpc.com.au

MMOs:
Stairway to Heaven, Road to Hell

Stuart Andrews ponders why so many MMOs fail, and what it might take to beat World of Warcraft.

F irst, a question: what do the following games have in common? Two titles based on the biggest names in fantasy fiction; another licensed from a legendary tabletop RPG; one designed by the man behind Ultima; another by the brains behind EverQuest; an innovative game of adventure on the high seas; and finally, a post-apocalyptic hybrid of Doom and Diablo.

Answer: They're all massively multiplayer online games, and they have all, at some point in the last two years, been hyped as games that might help redefine a genre. Today, however, they're all widely seen as failures, disasters or at best, underachievers.

It's still a good time to be in the business of massive multiplayer online games – provided your company is Blizzard. World of Warcraft (WoW) currently has just under 12 million subscribers, and its two expansions have each sold over four million copies. Compare that to Funcom's Age of Conan: Hyborian Adventures, which sold over one million copies at launch, yet now has fewer than 100,000 active subscribers and half of its original servers in use. Warhammer: Age of Reckoning has sold over 1.2 million copies, yet only a third of these buyers continue to subscribe. The failures of Vanguard: Saga of Heroes and Hellgate: London also killed their developers, and the former, like Pirates of the Burning Seas, has only survived thanks to the patience of Sony Online Entertainment. Richard Garriot's much-hyped Tabula Rasa was supposed to be a 'clean slate' for MMOs; instead, it was wiped clean again less than fourteen months after its launch. Even Turbine's critically acclaimed Lord of the Rings: Online has met with more modest success than many feel the game deserves.

So where did these games go wrong and what did WoW do right? Can these games fight their way back, or is there only room for one game in this business? That's what we're here to discover.

Richard 'Lord British' Garriot prepares for launch. If only Tabula Rasa had been ready for its anticipated debut.

Have a vision

WoW might not be perfect, but it's a game that was built with a vision; to make the world of the Warcraft RTS games come to life in a vivid, fully 3D manner, and to create a game that the widest possible audience could enjoy. MMOs take a long time to build – you're not making eight to ten hours worth of play, but a world that can be explored for months and years on end. If you don't start a game with a strong vision, you might as well give up.

Tabula Rasa, for example, took nearly seven years and reportedly cost over $100 million to develop, yet it was six years into development before anything that the public could actually play was produced. A blog entry by Scott Jennings, an MMO designer working on another project at NCSoft's Austin, Texas, offices, says it all: "It just wasn't a game that very many people got passionate about." The game's biggest failing, Jennings explains "was that it was in development about twice as long and [cost] twice as much as it had any right to".

Why? Arguably, a lack of coherent vision. Originally devised as a new breed of MMO, taking the best of Far Eastern and Western MMO traditions, Tabula Rasa was developed by teams working both in Austin and Korea. Unfortunately, several iterations of the design failed to bring the disparate styles together. Two years after development started, 75 per cent of the code, 25 per cent of the team and all of the game's art assets were replaced. The exotic sci-fi/fantasy mix of the original version was shelved in favour of the safer, more Halo-esque style of the finished game.

Many people have jumped on the fact that games such as Hellgate: London, Tabula Rasa and NetDevil's Auto Assault have suffered because they diverged from the standard fantasy MMO world that WoW has defined. Gamers, according to the theory, know where they are with chainmail and broadswords, but they don't feel that plasma guns and force-fields fit in with RPG gameplay. For NetDevil's Scott Brown, however, that's part of the excitement. "Taking games beyond what has already been done is something we set out to do when we started NetDevil... maybe we're

sick in the head, but we love the challenge of doing new games," he comments.

For Jeffrey Steefel, executive producer of Turbine's Lord of the Rings Online, there's nothing wrong with doing something new, as long as you're doing it for the right reasons. "If you're trying to be different for [its own] sake, because you believe that if you just build something that's fundamentally different from everything else, then that will be successful, then yes, you're going to have problems," he argues. "But if you identify that the needs of the marketplace have changed, perhaps because the market is bigger, or is just different, and you do something different to address that, then there are all kinds of opportunities."

Erling Elesson of Age of Conan developer, Funcom, agrees. "Everybody wants a new MMO that will feel different and play differently. However, [people] won't accept innovation just for the sake of innovation. It still needs to play well and it needs to be as much fun as previous-generation games," he says. "That's the challenge for us as developers – to innovate, but still manage to keep what's good about other games."

Elesson and Steefel both worked on games based on established intellectual properties. While the developers working on Tabula Rasa and Hellgate had to create both a game and its world from scratch, Steefel and his team had a different task: creating a Middle Earth that Tolkien's readers could explore, enjoy and recognise. "The most important thing for us was to boil down the story and world that Tolkien was writing about to more fundamental [elements]," he says.

These fundamentals drive everything in LOTRO, from the way the world looks to the way characters behave and the content unfolds. "Working with an IP like this is really a

double-edged sword. It certainly makes things harder, as it does for anyone in media who is making something around an existing IP. The Watchmen movie is an extreme example of how it's really difficult to bring something to fans who have an iron-clad expectation of what it's going to be. Fortunately, with Tolkien, as it's a much broader audience – hundreds of millions of people have read the books – there's a little more play, and the world that Tolkien built is so rich and deep and broad, that it has a lot of room in it for things that you don't know so much about."

Don't rush the BETA

More than any other type of game, MMOs have a symbiotic relationship with their players. It's crucial for the technology powering the game and its play mechanics, and its reputation and public perception are all positively defined in the BETA stage. In the early days of MMO development, the traditional closed and open BETA phases (the former private, the latter public) were an opportunity to test technical aspects of the game and see how it played with a live audience. Not any more: as NetDevil's Scott Brown states, "The BETA period isn't for testing any more; it's more about marketing. Of course, it's the first time you get a sense of the scale of players and true balance, but the game needs to be polished by the time it goes to BETA."

Brown should know. By the time Tabula Rasa was entering its BETA phase in spring 2007, NetDevil's Auto Assault had already become a byword for disastrous BETAs. Its BETA involved the servers being shut down halfway through development so that the game could be comprehensively reworked – a move from which it never recovered. "One of the mantras that went around production discussions after Auto Assault's launch was that

The problem with Age of Conan? Everybody loved the atmospheric first 12 hours in Tortage, but the content outside wasn't ready. Players won't pay for poor-quality play.
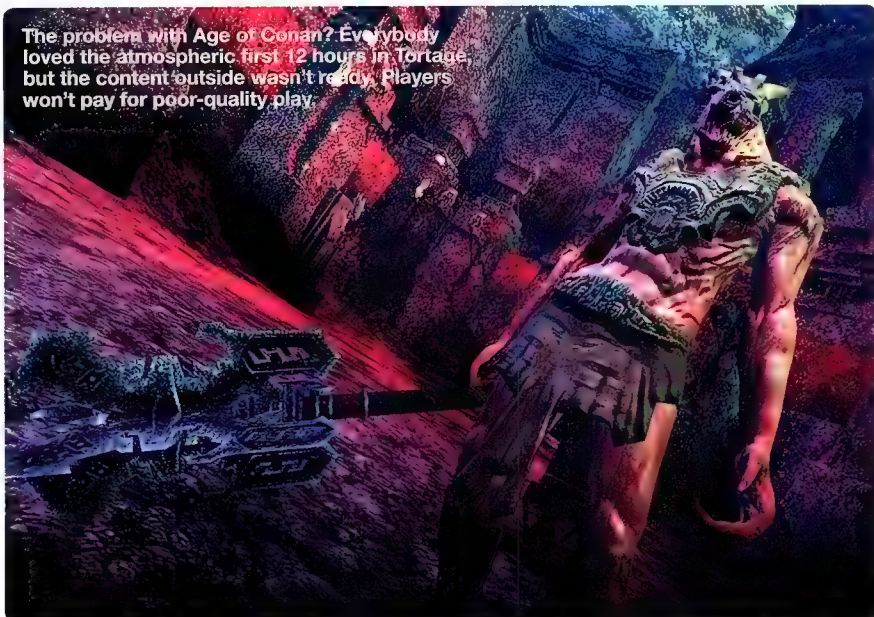
PLAYER VS PLAYER

It's hardly a contentious point that an MMO needs players to work. After all, it's right there in the name. What is contentious is the extent to which MMOs should adopt PvP (player vs player) combat. In the olden days of Ultima Online and EverQuest, there wasn't a choice; if you didn't team up with other players, you couldn't progress through the game. In fact, games such as Mythic's Dark Age of Camelot were focused on PvP right from the start.

As with so many MMO elements, WoW changed this overnight. While WoW's high-level raids and dungeons are impossible to tackle without a strong and concerted band of player heroes backing you up, a lot of the game's content was designed to be played solo. The Burning Crusade and

case of the latter two games, large-scale PvP? For Warhammer, arguably PvP was part of the game's roots, given that it was based on a competitive tabletop game and written by Mythic, developer of Dark Age of Camelot. The problem is that the game's realm vs realm gameplay and large group public quests rely on a strong and balanced player population to make them work. This is one reason why we recently saw 63 of the game's servers shut down

about maintaining a balance. "Age of Conan provides content for both groups – those who enjoy killing other players and those who don't. However, I'd say that Age of Conan is a fairly PvP-centric game, just because it's so enjoyable and there are so many features supporting it," he remarks.

Sadly, the PvP emphasis in Age of Conan has a dark side. Not only has life on PvP servers been miserable for some people due to high-level players continually 'ganking' lower-level players near spawn points, but the game's high-level PvP game, centred on besieging rival player Battlekeeps, was effectively broken at launch. These issues have been fixed with recent patches, but even now, there's disquiet on the

Wrath of the Lich King expansions have, if anything, pushed this further. Other games, particularly LOTRO and Guild Wars, took this on board. Jeffrey Steefel believes that "people don't want to spend 100 per cent of their time grouped with tons and tons of people, but rather play in a world that isn't lonely".

So why did Vanguard, Warhammer and Age of Conan take the riskier strategy of focusing heavily on group play and, in the

to consolidate populations.

For Age of Conan, it was partly the case that PvP suited the bloody, barbaric nature of the Conan universe, but also the fact that Funcom saw a strong PvP game as a key differentiating factor against WoW. For Funcom's Erling Elleson, it's all

player forums; the new 'fugitive' system, designed to punish 'ganking' is widely seen as Funcom breaking its promise of free-for-all PvP. As with anything in an MMO, it's a challenge to stay true to the game and your hardcore players without alienating everyone else.

if you can't get people to play the BETA for free, you have serious, serious issues," states Scott Jennings in his blog.

Unfortunately, it appears NCSoft's management didn't listen when it came to Tabula Rasa. According to blogs by Jennings and the ex-Chief Technical Officer of NCSoft Europe, Adam Martin, it was widely acknowledged internally that the game

wasn't ready for its BETA test when the date rolled around, yet the game was rushed into it anyway. As Jennings recounts: "Tabula Rasa had those [same] issues. Not as bad as Auto Assault – there were people doggedly playing every night and presumably enjoying themselves... but it was pretty clear, at least from my completely disassociated and busy with my own thing viewpoint, that there wasn't

a lot of excitement." The same mistake was made at developer Sigil with the BETA release of Vanguard. If post-closure interviews are to be believed, the game was rushed to BETA and then to launch, when the majority of Sigil's staff knew that it wasn't ready.

The BETA is important. The hardcore MMO community will alight on and pronounce judgement on a new game as soon as the

Despite some interesting and innovative gameplay, Auto Assault is now best remembered as the game that tanked before release. If people won't play your game for free, they definitely won't pay to play it.

servers open. Positive word of mouth at this point creates positive momentum, while negative coverage has the opposite effect. Playing an MMO with friends is a key reason why they're popular, and if a group of friends is influenced to make the move to a new title, this can help drive a game's popularity, which underlines the importance of early adopters.

Do you get a second chance to make a first impression? According to Erling Elleson, the answer is yes. "Most games of this type change quite a lot from BETA to release, due to the nature of how they're developed." Nonetheless, he admits that a bad BETA can have a major impact. "Feedback from testers is extremely important and you're right about the fact that

if you haven't got a good BETA then you might be headed for troubled waters. It's definitely a challenging process."

Failure to Launch

Of course, Vanguard and Tabula Rasa didn't just have a bad BETA – they also had a bad launch. Another two issues come into play too: accessibility and stability. WoW might contain its fair share of grinding (see p.72), but Blizzard understood from the start the importance of making the game appealing and accessible from the outset. The same can't be said of all MMOs – some recent games still hit you with tedious, unimaginative tutorials (Tabula Rasa) or slow 'fetch ten of these' quests in unfinished

starter zones (Vanguard, albeit fixed by a recent expansion).

The beginning was one area that Age of Conan did get right. "It's extremely important to get the first few hours right. Many, if not most, gamers judge a game on their experiences with it during the first few hours of playing time," says Erling Elleson. "During those hours you get a sense of how the game plays and the mechanics behind it, and you make up your own mind on what sort of feel you get from the game, and whether or not it appeals to you. Making sure that the first 20 levels really captured the player was always important to us."

Turbine's Jeffrey Steefel agrees, and the next expansion for LOTRO brings in a streamlined new player experience designed to hook people faster. "When people get past a certain point in the game they love, they're engaged. The problems [for us] come with the people who start to play, feel like it's a lot more involved than they thought it would be and give up before they start having lots of fun."

The second issue for MMOs is stability. Vanguard and Age of Conan were both criticised at launch for unreliability. The former suffered from visual glitches, poor frame rates and a range of game-breaking bugs, while the latter was afflicted by performance issues and persistent crashes. While Vanguard was packed with innovative and sometimes brilliant features, for many people, the game was just too broken to enjoy. After Sigil's messy demise,

Lord of the Rings succeeded in creating a recognisably Tolkien world and creating a more accessible experience, so why has it not had WoW's success?

CHANGING THE GAME

One of the biggest mistakes a developer can make is to change an established, but not hugely successful game, in the hope of reversing its fortunes. Star Wars: Galaxies became infamous for its 'New Game Experience' patch – a redesign of the game's classes and mechanics that was supposed to reach out and grab a wider audience, but instead succeeded only in alienating the game's core following.

Since then, other games have faced similar accusations of chasing the WoW dollar instead of focusing on the game's existing fans. Look on the forums, and you'll see ex-players of Pirates of The Burning Seas lamenting a perceived shift of focus from historical accuracy and realistic naval encounters to melee combat, potions and supernatural encounters. Even LOTRO, generally speaking one of the most respected MMOs, has been criticised for adding navigational aids and easier missions for new players, as well as a new class (the Rune-Keeper) whose magical attacks contravene the established Tolkien lore. "We feel betrayed," states SiSL, an annoyed player on Turbine's forums. "We've chosen to play your game because it was Middle-Earth... if we were average game players who enjoyed such low-level flashy additions, there would be lots of other games to choose from."

it became apparent that the whole game had effectively been created in the last 15 months of its five-year development cycle. This was compounded by poorly implemented tools and only one person being responsible for quality assurance during 95 per cent of that time.

This wasn't a mistake that Blizzard made with WoW. "There are a lot of things that have made World of Warcraft successful," says Turbine's Jeffrey Steefel. "Some of it has to do with the fact that Blizzard makes great games, or that it's really well designed, or that it gets tremendous amounts of support, but one of the other things – maybe the primary feature of WoW – was that it was the first MMO ever to launch in the marketplace that was finished. That sounds silly, but within the industry, it was a revelation."

The long road back from hell

Can a game work its way back from a bad launch? Steefel is optimistic. "If a game is fundamentally interesting, and has some balance and design flaws in the beginning, and the developers demonstrate that they're aware of this and are really paying attention, and continuously improving it in a responsive way, I think that there's a lot that you can do," he

One of Warhammer's problems at launch was that so many players gravitated to the side of Destruction, not of Order. Only months later has the balance been restored.

states.

His colleague, Turbine's head of PR Adam Mersky, agrees. "You can bring it back. EVE Online is a huge example of that. If you're tied in with your community and are moving forward with them in mind in everything you do – both your existing and your potential community – you can get any game right."

This is the hope of Funcom's Erling Elleson as regards Age of Conan. He acknowledges that there have been problems, but believes that "the best thing we can do is make the game better – and we are. During the months following release, we've been putting out updates that have turned the game around completely. Stability, performance, content, features – everything has improved radically. Right now, our focus is to make sure we keep our current players entertained and reach the goals we have for Age of Conan. When we feel the time is right, we'll launch a more aggressive campaign to bring back players."

Retaining players

Age of Conan might have had an excellent opening, but the game suffered from a marked disparity between the experience

offered in the first 20 levels in Tortage, and the experience players had once they went beyond this section. In effect, this left many players feeling conned. "Levels one to 20 worked very well, and player feedback was extremely positive. The graphics looked amazing, the atmospheres were spectacular and the game proved to be fun for a lot of players. Servers were stable and everyone logged in. Combat worked wonderfully, people reacted well to it, and we received a lot of positive feedback on quests and the story," Erling Elleson says. "The problems arose when people left Tortage and went deeper into the game, and content holes became apparent." In other words, the game became markedly less polished the further players advanced, and when many reached the end of their free month's subscription, they failed to resubscribe. Now, less than ten per cent of the people who paid for the boxed game continue to subscribe. Discussion of Age of Conan in some quarters is littered with references to broken promises about high-level content and PvP gameplay, not to mention the long-awaited DirectX 10 patch.

According to Turbine's Jeffrey Steefel, fixing issues and constantly introducing new content

is crucial to keeping the players interested in the short to medium term. "You have to acknowledge, immediately after launch, anything in the game that might not have been optimal, understand why that is and fix it. You need to make sure that you're keeping the game fresh. That doesn't mean reinventing it over and over again – in fact, reinventing a game isn't a good thing to do and games that have tried it have had a difficult time – but when someone is paying for ongoing value, you need to provide them with more things to do.'

MMOs, of course, should have an advantage in that the developers receive direct feedback, both in terms of forum posts and the data they

when the developer starts making changes. In any MMO, changes are inevitable. As content is poured in, character classes need balancing and difficulty levels need adjusting. The trick to this tweaking, Jeff Steefel reckons, is that "you [should] never do it for tweaking's sake. You do it for a specific goal or objective, and if that objective has been met then you stop whatever you're doing until there's a new objective." In LOTRO's Moria expansion, for example, Turbine introduced two new classes, namely the Warden and Rune-Keeper; this meant that, having spent ten months since launch balancing the classes, the team had to go back in and start again. "We're still in the process of

to tell you what they want, or what's bugging them. You have to listen to them and work out what they're really trying to say. They say, 'I hate this new feature that you've put in', and what they might actually be saying is, 'I like the feature – I just don't like what it did to some other behaviour in the game.' But they're not even aware that's why it's bugging them."

Playing the long game

Above all else, an MMO needs time and investment on the part of both audience and publisher to succeed. Sadly, in the post-WoW world, both qualities are in short supply. While a handful of games are instantly successful, many see their audience peak in the first month then fall in the following months, as players either work their way through the content or move on to the next big game. This is something that the game's publishers need to understand, so that they can support the game through the tail-off. The problem is that some publishers have entered the MMO market with short-term profit in mind. "I think if you go into the endeavour of building this kind of game with your eyes wide open about how big an undertaking it is – it's a marathon, not a sprint – then you're more likely to succeed." says Jeff Steefel. "That's why games such as EVE Online and Dungeons and Dragons Online, which have persevered even though they might not have had the perfect launch, have survived – the companies releasing them know that this is the beginning of a long process."

Erling Ellenson believes that the success of World of Warcraft has led to unrealistic

Erling Ellenson believes the success of World of Warcraft has lead to unrealistic expectations.

can pull from the servers. The challenge is, as Erling Ellingsen notes, "making sure we do the right things at the right time, add content where content is needed, and pay attention to the features that players want us to focus on." For Jeffrey Steefel, it's all about listening to the hardcore players. That said, Steefel believes that developers still need to be careful, as "these people tend to be the most confident in their opinions – the most vocal and vociferous – but they don't necessarily represent the majority of the people playing the game."

Listening becomes particularly important

doing that," Steefel explains, "and one of the things that we knew to be true – we learned it from other games – and still seems to be true, is that it's the most painful process for our players, and for ourselves."

If a developer wants to keep players on board, they need to understand why the players find these changes so offensive. Steefel calls this 'technical listening', a process of looking at the complaints on the forums, then trying to tie these in to the data coming in from the servers. "They're game players, not game designers, and they don't always know how

Is Tabula Rasa proof that genre-stretching sci-fi MMOs don't work, or merely proof that they have to be consistently brilliant to succeed?

Come and have a go if you think you're hard enough! WoW still stands proud as the unassailable king of the MMO hill.

expectations. "Everyone expects someone to make another WoW, but the fact is that WoW has become a social phenomenon that is very difficult to match. From the outside, I think it puzzles a lot of people, such as investors, as to why it's so difficult to claim the throne from Blizzard. People in the industry, however, understand that no one expects to reach those numbers with a new MMO. It's something we all aim for, though, and it's nice to have such a holy grail to strive towards. It makes us sharp and keeps us trying harder."

Frankly, it will be very difficult for any game to match Blizzard's monolith. MMOs are social in their nature, and this means that the highest numbers of players will inevitably gravitate to the most populated games. It isn't impossible though – people used to say that EverQuest would never be toppled, and when WoW launched, few saw it as the future king.

The future

Despite the troubled launches and subsequent failures of so many recent MMOs, people in the industry remain confident. NetDevil's Scott Brown is now working on a new space combat MMO called Jumpgate: Evolution, as well as the upcoming LEGO Universe MMO. He shrugs off any idea that the genre might be dying. "First, look how well both Conan

and Warhammer did at launch. Obviously, the users are there if you want to get them. Second, look at games such as Lineage in Korea; almost 20 per cent of the population have played that game at some point. As big as WoW is, there's probably only one per cent of the US population playing that game. We have a long way to go."

Jefftrey Steefel feels that what we're seeing is the MMO growing up. "There might not be room for another WoW, but this doesn't mean that there's no room for games in other styles, he comments. "You need to look at the market and understand that there are many different people out there, who connect together online."

The MMO is migrating from being a type of game to a type of entertainment. As Turbine's Alan Mersky points out, the MMO industry is still young – even its oldest games are just over a decade old. "There's a huge opportunity to use different business models," Mersky enthuses. "There's a huge opportunity to go to different platforms – for instance, it was said that an FPS would never work on console, and clearly that wasn't the case. I think the same goes for the MMO, and we're going to see games coming through in different flavours, suiting different niches."

These are interesting times for the MMO. Certain games, such as Cryptic's cross-

platform (though we're hearing rumbles as of writing that the Xbox 360 side of the equation is looking shaky –ed) super-hero MMO Champions Online, or SOE's PC and PS3-spanning DC Universe, will be seen as test cases for 'more accessible' MMOs. Meanwhile, incoming free-to-play MMOs such as SOE's Free Realms or the Cartoon Network's FusionFall will help us to predict whether new business models will be effective. Above all else, it seems that developers are learning that games that have failed, or seem to be failing, haven't done so for spurious reasons, but because of wider or more endemic problems in their conception or production.

It only takes one game, such as WoW, to get things right and the genre takes another big step forward. Who knows where and what the next big thing will be?

HARDWARE

NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

No matter your grade of hardware lust, this month we're sure we've got you covered. We kick off with an in-depth, Atomic-grade look at Intel's latest server chip, the new Nehalem-based Xeon CPU. At the other, slightly more attainable level of the spectrum, we've got a range of mice and gaming hardware from

OCZ and Logitech on test – time to upgrade your keyboard or mouse?

We've got the new Core i7 975, a mess of motherboards and graphics cards, 11 of the most popular heatsink and fan combos and we're finding out the best for you.

Is it Atomic? Yessir, very Atomic.

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msi™

32

46

HOW WE TEST

We do a lot of testing in our labs, and we look long and hard at every piece of hardware to determine whether or not it passes muster. From taking a new card out of its packaging, to bundled extras, to performance, every facet of a given piece of kit's 'user experience' is under scrutiny.

In some instances, we have tough benchmarks to help us rate gear. For a CPU or a graphics card, raw performance is of course the most vital stat as whether it stinks or smells like roses. But there are other things we pay attention to in the review process.

Value for money is an important consideration, especially during the current financial climate. High end gear is expensive enough as it is, so we also look for good bundles. For instance, a graphics card that comes with a game or two, all the cabling you'll need, and little surprises like tools and other bumpf will score higher than a card that costs similar, but doesn't give you any presents.

Build quality is another thing we rate. From a PC case to a motherboard, we like our hardware well made and capable of a taking a bit of punishment. We also like any included manuals to be clear and concise.

A lot of what we look for can be hard to put into numbers, we admit, but we try to think about what any enthusiast would think about their new gear after laying down money for it, installing it, and then using it.

And our benchmarks help, too. We've tried to pick a suite of games and applications that anyone can get access too, so that you – the reader – can easily compare your own gear with the kit we have in each issue. In fact, we'd recommend to all our readers that they run all of these tests on their systems and save the results, so you can always have a familiar benchmark of your own to compare to the latest gear in Atomic each issue.

HOT AWARD WINNERS!
ISSUE 102

Just some of this month's HOT AWARDS...

SAPPHIRE 4890
"Sapphire's 4890 is our new favourite high-end overclocker."
95/100

XFX 4770
"... the XFX 4770 is a bloody good choice for any enthusiast or gamer."
95/100

ANTEC P183
"... there's no doubting this is one of the neatest andquietest cases we've seen."
90/100

Our gaming test rigs: NRG systems with Phenom 9850 CPU, 4GB of DDR2 RAM and a 4870X2 graphics card. The mainstay of our games testing.

CPU Benchmarks:

Hexus Pifast
http://pifast.hexus.net/pifast.php
PiFast is a program that essentially calculates pi to a set amount of decimal places. It is a single-threaded application (one core/thread) and we run it at ten million places (10, 000, 000) using the Chudnovsky method, in the standard mode with no compression, and a FFT length of 1024kb. The program is free, so feel free to run it on your CPU and compare. Memory bandwidth plays a significant role in the final performance of this program, so be sure you bump up the frequency as well as the CPU clock!

wPrime
http://www.wprime.net/
"wPrime uses a recursive call of Newton's method for estimating functions", says the website as it attempts to explain in plain English what it does. What it does is, essentially, complex square rooting and other number functions, which are able to be split up evenly between multiple cores, or simply run on a single core. We use wPrime 32M in both single and multi-threaded. The results of the single run are divided by the results of the multi run, and this gives us the efficiency of the CPU being tested – very useful knowledge to have when comparing chips and evaluating the benefits of overclocking.

Cinebench R10 x64
http://www.maxon.net/pages/download/cinebench_e.html
Cinebench is a stalwart benchmark, and is one of the more entertaining ones to watch. It focuses on rendering an image at 800 x 600 resolution, complete with ray-traced light effects and much more. This is able to be run in either singlethreaded or multithreaded mode, and efficiency is calculated exactly the same way as for wPrime. Simply download the .zip file, extract, and run! The program also supports up to 16 threads in total, and even eight threads with Nehalem is an impressive sight to see. The difference in performance between 32- and 64-bit is minimal – just keep that in mind if your results for the same setup are slightly different.

Everest Ultimate Edition
http://www.lavalys.com/
Everest is a system information tool that monitors voltage, temperature, as well as reporting on a massive list of other areas of your system. Hardware and software are noted here, but perhaps the most useful part of this program is the memory benchmarks. Ready for the fastest of dual/tri-channel memory, this tests the read and write bandwidth as well as latency. The program is a small download, but keep in mind that you only get a thirty day trial until you purchase the full version – something recommended if you're into getting the most info about what your tech is up to.

GPU Benchmarks:

Crysis
http://www.ea.com/crysis/
When Crysis was released, it was the beast that literally broke many so-called hardcore rigs, reducing the owners to tears. Even now, more than a year after the game's release, this game is still exceptionally graphically challenging. As such, it's the perfect choice for our testing, and something that you can test, too, if you've got a copy – just set all the settings to Very High, with no AA/AF, DirectX 10 and a resolution of 1,280 x 1,024 – and go for your life! Results are recorded as the last result of the final benchmark passthrough, to give the fairest comparison.

Race Driver: GRID
http://www.racedrivergrid.com/
GRID, as some racing afficionados will know, is one of the most fun games of its genre to come about for quite some time, giving an accurate damage model along with realistic handling and a great visual style. Not only that but it is also very scalable over multiple GPUs, and is also capable of running on lower-end gear. We chuck all the settings to High, with 8xMSAA, at 1920x1200 for this test, using FRAPS to monitor the frames per second as we tear around the track for a single lap in our car of choice – the Nissan 350Z.

3DMark 2006
http://www.futuremark.com/benchmarks/3dmark06/introduction/
Designed as a benchmark for DirectX9 based systems, 3DMark 2006 (or 3DMark06) has been a staple of the enthusiast diet for many years. With four graphical tests, and two CPU tests, these combine to give a final overall score that allows direct numerical comparison to any other system in the world and, best of all, it's completely free. Just head to the URL above, and download your copy to compare to any of the reviews in the mag. All of the tests are run at stock settings, so just install, run, and compare – it couldn't be easier!

3DMark Vantage (2008)
http://www.futuremark.com/3dmarkvantage/
As the first extremely convenient benchmark program around for DirectX 10, 3DMark Vantage is a new contender in the benching scene – and is proving very popular. While you can download and run it for free, this is only once, requiring a small fee to register your copy (though the bragging rights for showing off your rig may be worth it). Some graphics cards will even give you a copy! We run this at stock settings, which is the most appropriate for comparison between our results and yours. This is also significantly better at multi-gpu performance scaling efficiency.

Hacking the Mainframe

Justin Robinson serves up some big-iron-powered computing.

Desktop PCs and laptops are the bread and butter of the computing world that most people interact with every day, serving the images, text, sound and video that we love. What most people don't know is that the server hardware completely off-site does most of the work, collecting and storing the data that you access every time you load up any webpage. This isn't consumer-grade tech but rather the real deal that is meant to run all day, every day – non-stop. The demands placed on the hardware are wildly different, so read on and we'll do our best at highlighting the hardware differences and features that are most interesting and finally get some Atomic style modding done to take this tech to places it's never really been before.

What's Eee-on?

One of the most instantly recognisable and important differences between a server and a desktop PC is the CPU buried deep within, and all Intel-based servers (such as the ASUS RS700-E6/RS4 server we have for this article) will run them, collectively named Xeon. Intel's latest in the Xeon range are the 5500 series chips,

based on the Nehalem (also known as Core i7) architecture, with four cores per CPU. Most servers run two of them in a single board.

Sharing the same architecture means the hardware will execute software in a similar way to their desktop counterparts running through the same Fetch, Instruction Queue, Decode, Branch Prediction, Loop Stream Detector and Execution phases that all Nehalem CPUs will follow. The main difference here is that these CPUs are designed to be flogged at high load levels for long periods of time, and as such have subtle differences to set them apart. One of these is support for x64, virtualisation and PAE (Physical Address Extension).

Most noticeable is the enhanced Turbo Mode, which will actively monitor at a hardware level the amount of load each core is under, automatically overclocking the CPU if there's enough thermal headroom or underclocking inactive cores when not loaded. Added to this is Intel's new High-K Gate technology, which allows greater control over electrical leakage as well as entire sections of the die. This means that entire cores can be effectively turned off to allow higher overclocking of the remaining active cores, giving a huge amount of flexibility.

The design of a server is physically different to a desktop PC too, with the main idea being that hot-swappable hard disks will be at the front, cooling fans in a long row behind that, and then everything else. This creates a wind tunnel of sorts, and is intended to get the heat out of there without any reservation in terms of the noise it makes doing so – we measured an idle noise of 79.6dBA and a load noise of 81.7dBA. In other words, uncomfortably loud. Since the form factor for a server can be different, the server boards can be fitted to each casing per manufacturer. The ASUS server we're testing contains dual Xeon 5570s, so the chipset used here is the

5520 'Tylersburg', giving full access to PCIe 2.0 lanes as well as one of the biggest updates to Intel servers in recent years; the QPI.

I cannae give her any more, cap'n!

Fun as acronyms are, this one means Quick Path Interconnect, and is a replacement of the old and incredibly limited Front Side Bus or FSB. It's a point-to-point link that operates at a huge speed of 25GB/s, linking each CPU to the northbridge as well as each other. Each core in each CPU also has its own chunk of system memory to work with; if a core needs extra it simply burrows through the QPI to access it elsewhere. There is a huge 24GB of DDR3 memory installed in this server, but memory up to 128GB isn't uncommon in some servers. The QPI was one of the most important technologies to hit the mainstream market and while AMD had its HyperTransport years ago, this is the first true mass production high speed link out there.

All this bandwidth is put to good use by the dual processors, each getting their own area of six DDR3 slots, and giving a huge amount of computational legroom. Thanks to the Nehalem tech powering the Xeons, this memory is needed even more than ever – they come with Hyperthreading. This essentially takes two software threads and pumps those two into one core, where each thread is worked through concurrently to enhance performance; theoretically this prevents a core from remaining idle, and allows it to chew through even more data. When first introduced with the Netburst architecture (back in the Pentium 4 days), the processing power simply wasn't there to take advantage of it, something that has thankfully changed in recent years. One inevitable point about spades of performance is that we'll have
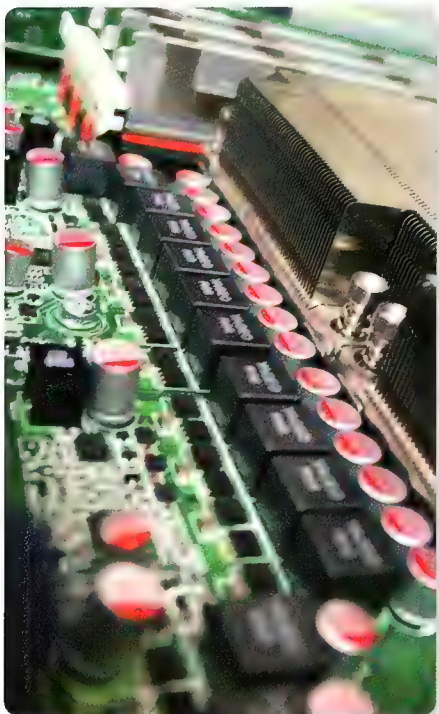
extra capacity to load it, which brings us to the next point about servers.

Multiple personalities

Looking at the average desktop PC you'll usually find a single operating system, possibly even a dual-boot of Linux and Windows. Look at a server however, and you're likely to find a great many operating systems running all at the same time – why and how is this done?

First is the why, which we'd childishly retort with "why not?" Seriously though, a single server with plenty of performance headroom has room to spare, and a single operating system would be wasting a lot of the potential on offer. Thanks to solutions out there like VMware (**www.vmware.com**), you can install as many virtual operating systems on a server as you have want or need for. This means you can run a storage server, database server and a network filter all from the one box as opposed to separate ones.

How is a little simpler, if you treat each operating system as a 'program' running on the server. Each 'program' has an allocated allotment of system memory and processor access, which can be managed and set

... server harddrives that spin at 10,000rpm have a very annoying tendency to burn themselves out after a few months...

remotely depending on requirements. This means that you can specify exacting needs from the 'programs' (which themselves are running their own applications), and efficiently squeeze every last mote of performance from the tech. The coolest thing of all is that the operating system need not be installed on every server – you can point them at one central install and multiple servers can boot from there!

Odds and bodkins

With all the enhancements over a desktop computer, there are also some areas that produce a little problem every now and then. Servers for the most part are entirely remotely operated and controlled, meaning that fast graphics processors aren't needed in the vast majority of cases once they're plugged in. Most will still come with a VGA port on the back and a basic display, but nothing worth writing home about.

Since servers are inherently internet and network connected every single one will have at least one Ethernet port, and in the case of the ASUS one we have here it has two. They run at a minimum speed of 1GB/s, but the ports in this one take advantage of Intel's 10GB/s onboard controller, and allow extra bandwidth – assuming the switch it's connected to also offers this capacity. Much more popular are add-in fiber-optic cards that allow up to 100GB/s of speed. Unfortunately in a lot of cases 10GB/s isn't enough, and 100GB/s is far too much!

As they're constantly being used, server harddrives that spin at 10,000rpm have a very annoying tendency to burn themselves out after a few months or years, and they need replacement very often. Good backup and redundancy (eg RAID) prevents data loss from dead tech, but it's something that desktops don't have to deal with too much. With all the
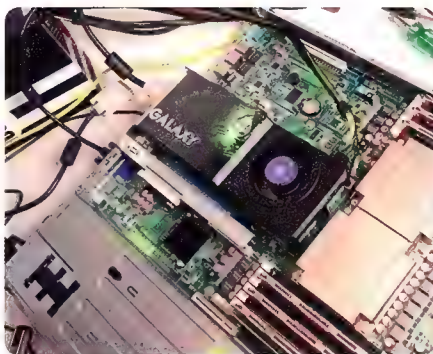
good points and some negatives covered, it's down to the numbers to tell us the most important part of all – why we bother.

Grand design

The server we received had two blank Seagate Barracuda 7200.11 320GB harddrives in it, as well as a dinky little DVD drive. We installed a copy of Vista x64 Ultimate (only Ultimate and Business will identify and use two physically separate CPUs), all our benchies and gave them a run-through. Our reaction was mild surprise; it was faster than we thought!

Single threaded applications performed identically on one core as on their desktop counterparts, which was unsurprising, but when we kicked in the full eight cores and sixteen software threads the true performance kicked in. Cinebench multithreaded gave us a score of 29452 at an impressive 6.76x efficiency increase. Considering the workload is being split up between two CPUs this is very good, and certainly the highest score we've seen.

wPrime was equally as impressive when multiple threads were run, finishing in 4.883 seconds. That wasn't even enough time to say "the multithreaded result was four point eight eight three seconds" at normal speed out loud! This was a huge performance speedup of 8.26x over a single core, and with computational-heavy workloads this will shine. Memory bandwidth tests were not quite so high compared to a desktop thanks to the DDR3 memory running at safer stable speeds of 1333MHz @ 9-9-9-24. Since overclocking isn't really allowed through a server's BIOS, we did the very next most Atomic thing to it – and put something in there that shouldn't be.

One of these things is not like the other

Going so far out on a limb that you'd swear it'd break under the weight of our imagination, we wondered what it'd be like to run a server as a gaming rig – after all, you've got incredibly reliable hardware hooked up to two CPUs with a buttload of RAM; why not put it all to some good use? The problem with this was that there's not really capacity built in to do this, and only a single sideways riser-mounted PCIe x16 slot in the middle of the case. Our solution? Build it in.

Removing as much of the metal bracketing as we could with a screwdriver as well as the top panel for the case, we placed some insulating cloth tape over the northbridge heatsink and installed a Galaxy GTS250. This was due to space being incredibly limited, but once we had the card in there it looks like it almost belongs… but there's no power for it.

Thankfully we had an Antec Quattro 1000W lying around; we then needed a paperclip to insert into the 24-pin ATX power cable that turned the PSU on whenever it was plugged into the wall. This can be done with any 24-pin cable by bridging the green cable to any black cable – but be incredibly careful! The PCIe power cable was plugged in to the graphics card, the system booted, and latest NVIDIA drivers installed.

We had a look at this card back in Issue 100 but thanks to the twin CPUs and server hardware, OpenAL refused to run. Both 3DMark programs and GRID depend on this, so only Crysis can be run to completion – and we got lower performance in every segment except for the maximum fps. Oddly the image that was displayed might have been a lower fps, but it was incredibly smooth and didn't judder at all, like watching some kind of pre-rendered video instead. The usual bottleneck in modern gaming rigs –the CPU – is absolutely not slowing anything down, so even though you might get a lower frame count, it's still very regular. It really is impressive to watch

So, what's the word?

All in all, servers are exceptionally useful tools for their specific uses in virtualisation and the storage-heavy datacenters that fuel our internet addiction. What they are not good for is gaming; if the open case and additional dodgy PSU mod don't put you off then the constant 80+dBA noise will definitely do so. Xeons offer a lot in other areas, so here's to the future where dual-CPU rigs are actually worth it. Now where did I leave that paperclip… **JR**

Intel Xeon server

Dual Xeon 5570	133x22; DDR3-1339-9-9-24; 2.93GHz
PiFast	26.41s
wPrime 32M – single thread	40.31s
wPrime 32M – multi-thread	4.883s (8.26x efficiency)
CineBench R10 64-bit – single thread	4355
CineBench R10 64-bit – multi-thread	29452 (6.76x efficiency)
Everest Read	12461MB/s
Everest Write	6360MB/s
Everest Latency	68.9ns

Intel Xeon Server *Crysis Benchmarks*

Average	52.92
Minimum	31.85
Maximum	73.07

Frames per second

Core i7 975 3.33GHz

Intel's biggest just got bigger.

Street Price $1695   Supplier Intel
Website www.intel.com
Specifications 3.33GHz quad core; 45nm manufacturing process; 'Bloomfield' core; 32KBx4 L1, 256KBx4 L2, 8MB L3 cache; 25x unlocked multiplier; 133MHz QuickPath Interconnect; 130W TDP.

When the Nehalem architecture first came out last year, enthusiasts and those in the tech world felt an awe that we hadn't felt since AMD trounced Intel with its Athlon CPUs back in the day – and a sudden urge to change our pants. From the wild success of its Core 2 series of CPUs, Intel managed to not only outperform them but do it by a significant margin; packing in an integrated DDR3 memory controller as well as a whole new system interface in the form of the QuickPath Interconnect (QPI).

We looked at their very first chip based on the Nehalem architecture, the Core i7 965, which was clocked at a stock of 3.2GHz and had an unlocked multiplier – as well as a launch price of almost two grand. The new Core i7 975 chip is the successor to the older 965, which is being killed off on the fourth of September this year. It's nowhere near the price of the other one, but is a still-hefty $1695.

Assuming you've got money to rampantly whack down on the table, buying this chip will net you a 45nm quad-core processor that contains all four cores on the one die. It's got a phenomenally huge 8MB shared pool of L3 cache, which feeds into four separate 256KB L2 caches and finally four 32KB L1 caches. All this cache space clocked at a huge speed – thanks to its proximity to the cores – means that bandwidth is huge within the chip. But that's not the only improvement this has over older CPU designs; it also comes with an integrated DDR3 controller that provides access to three memory channels. Three or six sticks of fast DDR3 can be accessed directly by the CPU for huge memory throughput (in some cases more than twice as much as older systems!).

This CPU has a base multiplier of 25x and a stock QPI speed of 133MHz, but thanks to the Turbo Mode feature it can be turned up automatically by the chip itself to get to a 27x multi, effectively giving a speed of almost 3.6GHz. As well as Turbo mode, it also has an unlocked multiplier meaning that you can simply raise the multiplier to increase the speed in steps of 133MHz at a time – in most cases this is the easiest way to increase your CPU speed without having to place much additional stress on the rest of the components on the mobo.

Performance at stock speeds was everything we could have expected of any Nehalem architecture running at 3.33GHz, which unsurprisingly can only be described as awesome. We got very good benchie results in all our tests, and the memory improvements of the integrated memory controller really shine in the memory bandwidth tests of Everest Ultimate. Oddly, version 4.60 of the software would crash when running on this CPU, but version 5.01 would run fine – it's a great tool for anyone interested in monitoring voltages/temperatures or benching their memory.

Overclocking was a pretty standard affair, and we chose one of two methods to get our final clocks. The most straightforward is to simply increase the base clock of the QPI in steps of 3-5MHz a time, increasing voltage when unstable – this places a little extra strain on the motherboard, though. We chose the other method, increasing the multiplier instead and raising the speed in leaps of 133MHz at a time, then finally tweaking the QPI when we reached the most unstable gap. This netted us a final stable result of 4.10GHz, and is a great choice for any enthusiast looking for the ultimate in CPUs. **JR**

Core i7 975 3.33GHz

1975	133x25; DDR3-1600 8-8-8-24; 3.33GHz	150x24; DDR3 1500 8-8-8-24; 3.75GHz	160x24; DDR3-1604 8-8-8-24; 4GHz
PiFast	24.57s	21.84s	20.50s
wPrime 32M – single thread	37.236s	33.088s	31.013s
wPrime 32M – multi-thread	7.191s (4.85x efficiency)	6.363s (4.81x)	5.957s (4.80x)
CineBench R10 64-bit – single thread	5076	5553	6612
CineBench R10 64-bit – multi-thread	20330 (4.01x efficiency)	22384 (4.02x)	23172 (3.85x)
Everest Read	16606MB/s	15899MB/s	16936MB/s
Everest Write	14080MB/s	13560MB/s	14462MB/s
Everest Latency	48.6ns	50.3ns	47.3ns

Performance
Fastest yet, unlocked multi.
98

Overclockability
Only 24 per cent, but over 4GHz is nice.
87

Value
Price premium for the best.
81

Overall
Takes the top performance spot with a flourish.
88%

DFI Lanparty GF9400

A tale of frustration and woe.

Street Price $215 **Supplier** Altech
Website www.altech.com.au
Specifications Socket LGA775; NVIDIA 9400 chipset; mATX form factor; 2x PCIe x16 (one x8 electrical); 1x PCI; 1x PCIe x1; 1x EIDE; 6x SATA; DDR2-1066

If you're reading this particular section of the mag (arguably the best section), you've probably had your fair share of tech that does everything you want, as well tech that absolutely refuses to behave no matter how much you spank it. This motherboard is very firmly seated in the latter category, all the more surprising considering the manufacturer's otherwise great reputation for enthusiast mobos – but before we get ahead of ourselves we'll give a brief summary of the board itself.

Based around the NVIDIA 9400 chipset (with integrated GPU of the same name), it's a mATX form factor with the LGA775 socket. DDR2 is the memory of choice, and storage covers IDE, Floppy and six right-angled SATA ports. 8- and 24-pin power are where they should be, PCIe slots are handy (though the yellow is only 8x electrically) and there's handy features like an onboard LED POST screen, mobo-mounted speaker and hard power/reset buttons. I/O options cover two PS/2, HDMI, Optical/Coaxial, DVI, four USB, Ethernet and 7.1 channel audio. There's plenty of space for heatsinks, though the northbridge cooling was a little warm. All those features add up to a very nice... paperweight.

When we were first sent this motherboard it seemed to be an excitingly coloured and decently laid out mATX board with bright colours on a dark PCB, adding a certain cool style to it. All our usual test-rig tech was installed, and the power button pressed. Hmm. The fans began to spin up, the harddrive made the usual whir as the motor spun, but no image appeared on the screen, nor did we get a POST beep from the onboard speaker. No worries, we thought, as we simply re-seated the

components and tried again – no dice.

Getting a little annoyed, we swapped out the E8400 CPU for a QX9650 to see if that was the problem and no, still a frustratingly blank screen. Memory swap did the same, as did four separate graphics cards and two power supplies – the components left to try were being slowly eliminated. We even tried another monitor, but none of the tech would work at all in this motherboard – but would work fine in a GIGABYTE EP45-UD3P or an ASUS P5Q PRO.

Since we'd nailed the problem down to a mobo issue, we spoke to the local distributor Altech and got a replacement arranged, assuming that it was merely a dead-on-arrival board (all manufacturers of all products have these from time to time). We got a fresh replacement in, quickly unpacked it and set it down to get... nothing. A clear of the CMOS by removing the BIOS battery, unplugging the PSU, then reinstalling both got the settings reset, and we booted again.

This time we managed to get a POST screen appear, huzzah! Casually hitting the DEL key to enter the BIOS, nothing happened. We hit it

again: nada. Turns out that USB keyboards won't work on a cleared CMOS, so we grabbed an old PS/2 'board and gave that a go, which finally got us into the BIOS. Once in we checked the USB keyboard support, which was enabled. The USB keyboard was in fact working now; and would only work while a PS/2 keyboard was installed. Getting royally annoyed at the board now, we went to save the changes we'd made when the BIOS screen froze – yes, the bloody BIOS froze. No changes would stick at all, so we cleared the CMOS yet again and rebooted, loading the default values to bypass that step, to see if we could boot.

Unfortunately it wouldn't recognise any attached DVD drive or HDD drive, meaning that we were left with a barely-functioning board that merely heated the northbridge up and made fans move – an incredibly disappointing experience that we'd not like to repeat. This might not be the case for every DFI board out there, but we had two separate pieces of the same mobo and neither would work. We'd only suggest this board to those few tech masochists out there who enjoy misbehaving kit, but for everyone else steer clear of this mobo. **JR**

The world's slowest party.
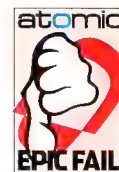
Performance 15
Holds down papers well though.

Value 30
Comes with some handy cables.

Features 86
Looks good on paper.

Build 9
Looks pretty, not much else.

Overall
A good example of tech gone wrong.

33%

GIGABYTE EX58-UD4P

Budget mobo for Core i7.

GIGABYTE is one of the biggest manufacturers of motherboards, so to ignore its products is a little silly. This one was sitting around the Labs for a while, and though we'll candidly admit that we hadn't got around to it yet, that's simply because we'd looked at the top-end EX58-EXTREME board months back – and that was so good it got into our Kitlog – but had too many other boards to give this one some love. Well that love-in time is now, so we got all our tech and whacked it into this budget-skewed mobo to see if we got any love back.

This board is based around Intel's current premium X58 chipset, one that offers more PCIe 2.0 lanes than a Vomitron offers queasy stomachs at the local carnival. Throwing a heatsink on top of this, GIGABYTE hooked it up to the southbridge and power regulation with a nickel-plated heatpipe construct. We've found this to be the best method of aircooling a board, though obviously the more metal (preferably copper) used in construction the higher the capacity for lower temperatures. The cooling array is secured with screws to allow easy removal for those into watercooling, though the power regulation and such will still need some form of cooling.

There's plenty of room around the LGA1366 socket for big coolers, with a significant amount of ferrite chokes mixed with solid caps surrounding it. Six DDR3 slots are lined up in the usual top-right corner, but they're squeezed right near the CPU and might interfere with heatsinks. Also in the top-right is a hard power button, reset button, and more LEDs than your average Christmas tree. 24- and 8-pin power sockets are in the usual places, while eight right-angle SATA ports
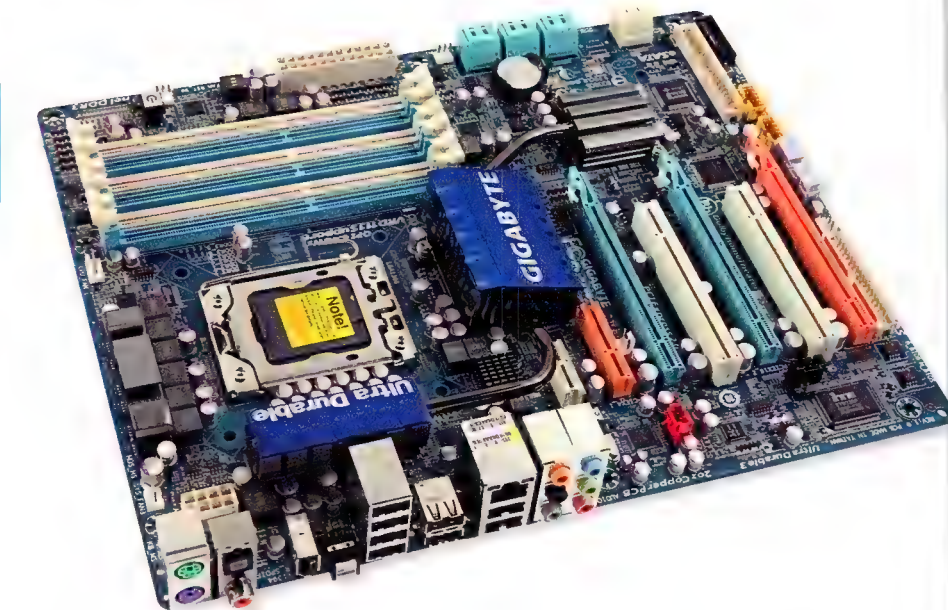
are lined up along the edge of the mobo. Two of these are coloured differently from the rest, and show that they're hooked up to the separate chip onboard (labelled as GIGABYTE SATA 2, but with a JMicron logo showing who actually makes it). RAID is definitely a possibility here.

Front panel headers and USB headers populate the bottom-right corner alongside a single IDE port, and two FireWire headers also lie along the bottom – concealed underneath grey plastic caps. A Floppy port rounds out the bottom of the board, while the audio header is in the usual annoying spot right behind the I/O ports. Expansion slots are pretty nicely laid out, though the bottom PCIe x16 slot only works as x8 electrical (physically limited in the slot itself). The top PCIe x4 slot is also limited by length – the chipset cooling has a screw in the way about a centimetre after the slot finishes, meaning that this is restricted to 1x or 4x devices only.

I/O ports at the back of the mobo include two PS/2, Optical/Coaxial, Firewire, Reset CMOS,

eight USB, Gigabit Ethernet and 7.1 channel audio. The latter is powered by a Realtek ALC889A chip, which is a relatively old chip (from circa 2007) but should still do a decent job of making noise come out (as always, a soundcard is the best option for great audio).

When we set to overclocking the board we found GIGABYTE's usual good BIOS, though USB keyboards are still off by default. We pushed the QPI all the way to 164MHz, which is nice. Flashing of the mobo was very easy thanks to the built-in updater and a simple USB stick, and the BIOS offered every option you'd expect. Amusingly it also warns you of any components you've overvolted when saving the settings, just to make it absolutely clear what you're doing (as if you didn't know). Overall this is a well-rounded board, with solid performance and a good price. **JR**

GIGABYTE EX58-UD4P			
	975 133x25; DDR3-1600 8-8-8-24; 3.33GHz	150x24; DDR3 1500 8-8-8-24; 3.75GHz	160x24; DDR3-1604 8-8-8-24; 4GHz
PiFast	24.57s	21.84s	20.50s
wPrime 32M – single thread	37.236s	33.088s	31.013s
wPrime 32M – multi-thread	7.191s (4.85x efficiency)	6.363s (4.81x)	5.957s (4.80x)
CineBench R10 64-bit – single thread	5076	5553	6612
CineBench R10 64-bit – multi-thread	20330 (4.01x efficiency)	22384 (4.02x)	23172 (3.85x)
Everest Read	16606MB/s	15899MB/s	16936MB/s
Everest Write	14080MB/s	13560MB/s	14462MB/s
Everest Latency	48.6ns	50.3ns	47.3ns

Performance
Overclocks well, otherwise fine.
92

Value
Missing some things, but good value.
80

Features
No NT200 chip hurts SLI.
81

Build
Small PCIe niggles.
86

Overall
A cheaper alternative to our Kitlog choice.

84%

MSI 790GX-G65

Designer heatsinks are so in right now.

Street Price $238   **Supplier** MSI
Website www.msi.com.tw/

Specifications Socket AM3; AMD 790GX chipset; ATX form factor; 2x PCIe x16; 2x PCI; 2x PCIe x1; 1x EIDE; 5x SATA; DDR3-1333

Gallery Link www.atomicmpc.com.au/?142710
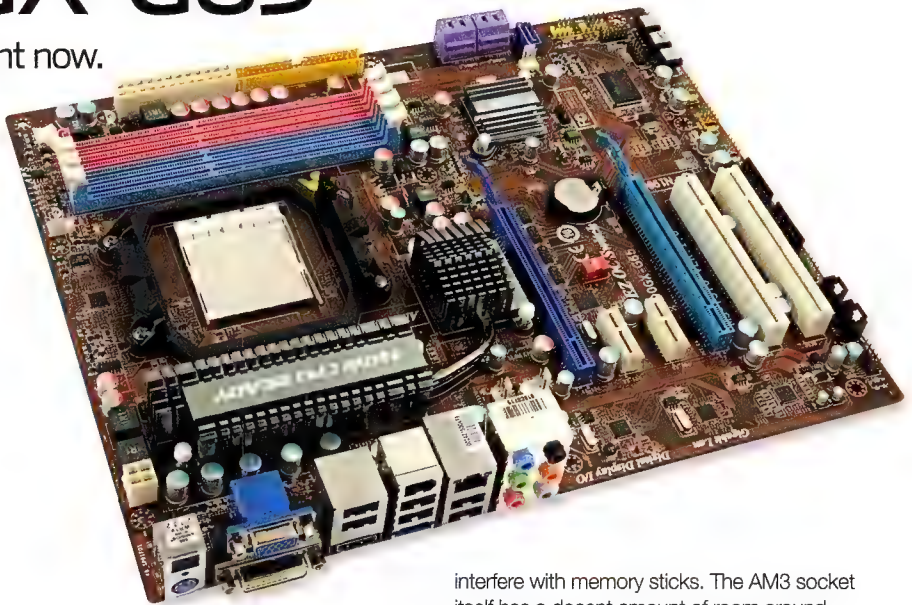
They say that beauty is only skin deep; but also not to judge a book by its cover. This motherboard from MSI fits under the latter saying. It's a horrendously bad brown colour, looking like it'd be more suited to a can of industrial-strength earwax than a PCB but when you start adding in the oddly coloured pinks, purples and blues everything gets confused – making this board look incredibly untasteful. Thankfully most people don't mind the look of their tech so long as it runs what they want, and does what they want, so with what most people want in mind let's have a look at the tech running inside.

Based around the ever-popular 790GX chipset, this board offers an integrated graphics processor that is roughly equivalent to a HD3300, and comes with 128MB of onboard GDDR3 to run it. It can also be overclocked through the BIOS, squeezing out a little more performance. As well as functioning as a graphics card (albeit a very underpowered one), this chipset also works as a northbridge and serves the expansion slots with all the PCIe 2.0 lanes needed for two full x16 slots, used for Crossfire. It hooks up to the SB750 southbridge chip that provides the rest of the expansion options including storage. The southbridge is cooled by a small aluminium heatsink, while the hotter northbridge is treated to a heatsink machined to have a very intricate design. This is connected via heatpipe to the power regulation's heatsink, dissipating all the heat built up by those components.

Backpanel I/O ports are reasonably well fleshed out, and contain Optical, PS/2, VGA, DVI/HDMI (only one at a time), six USB, Firewire, Hybrid eSATA/USB, Ethernet and 7.1 channel audio. The bottom edge of the mobo contains all the usual expansion options you'd expect, including a FireWire header, three USB headers and the front panel connectors. Hard power, reset and a clear CMOS button are also here which making overclocking outside a case easier (at least theoretically so). Four right-angled SATA ports are on the right edge of the board, with a single upright port used also. These are a sickly purple colour, and like most of the plastic components on this board don't look like they belong at all.

Brightly coloured IDE ports are apparently in too, though the 24-pin and 4-pin power connectors are the standard colours. We'd prefer seeing an 8-pin power connector for the CPU instead of four, as this will improve reliability when overclocking. Four DDR3 slots, colour coded with the correct channelling are present, but are also placed too close to the CPU socket for comfort, meaning that tall heatsinks will interfere with memory sticks. The AM3 socket itself has a decent amount of room around for large hunks of heatsink cooling, and fits all AM2+ coolers as it shares an identical mounting system. For those with watercooling blocks, all of the capacitors around the socket are well out of the way for fiddling with even the most awkward blocks.

Located between the two PCIe x16 slots is something that MSI has been chucking onto a lot of its motherboards of late, labelled as the EZ OC Switch. It's a pair of jumpers that go from off to on, which increase the HyperTransport bus speed depending on the combination you've got them set to – this doesn't touch the voltage so renders it kind of moot. Keep overclocking in the BIOS over this switch method. What little overclocking could be had was disappointing, hitting a max HT of only 228 – not even hitting the third OC level we do for our testing. The BIOS was well laid out, but the board simply would not perform as promised. **JR**

MSI 790GX-G65

X4 955	200x13; DDR3-1333 7-7-7-21	217x13; DDR3-1446 7-7-7-21	230x13; DDR3-1532 7-7-7-21
PiFast	34.04s	31.40s	
wPrime 32M – single thread	44.708s	41.013s	
wPrime 32M – multi-thread	11.479s (3.90x efficiency)	10.579s (3.88x)	
CineBench R10 64-bit – single thread	3689	3998	
CineBench R10 64-bit – multi-thread	13660 (3.70x efficiency)	14300 (3.58x)	
Everest Read	8244MB/s	8742MB/s	
Everest Write	6733MB/s	7307MB/s	
Everest Latency	53.0ns	50.3ns	

[WOULD NOT COMPLETE]

Performance 70
Nothing to be fussed over; poor overclock.

Value 75
Most things you'd want in a mobo.

Features 80
Comes with the basics, but nothing exciting.

Build 70
Works at stock, won't overclock.

Overall
Works okay, but won't overclock far at all.

73%

Sapphire 4890

Good price, good clocks, good performance... too good to be true?

Street Price $350   **Supplier** Anyware
Website www.anyware.com.au

Specifications 850MHz core; 975MHz memory (3900 effective); RV790XT core; 800 shader units; 1GB GDDR5; 256-bit memory interface; dual slot PCB with active cooling; dual 6-pin PCIe power connector

Card info www.techpowerup.com/gpuz/6e98e/

17% OC

Sapphire has long been known as something of a gem amongst other manufacturers; the company pumps out reference cards for prices as close to the lowest out there possible, and still manages to deliver high-performing overclocked cards too. This one is based on the reference design of the HD4890, which we first had a look at online (**www.atomicmpc.com.au/?141433**) and the price is typical of Sapphire, sitting in as the cheapest offering out there.

Based around the 55nm RV790XT core, there are 800 shader units clocked at reference speeds of 850MHz. Each of these units are essentially a mini-processor, and they all function as one collective 'whole' to chew their way through highly-threaded apps (it just so happens that games are one of the best uses for them). These are coupled with a 256-bit memory bus that is hooked up to 1GB of GDDR5 clocked at 975MHz, which is quad-pumped to give an effective speed of 3900MHz. In other words, a phenomenal amount of memory bandwidth that can keep the shader units more than full with data to work through.

Thanks to the Decap ring of transistors around the RV790XT core, the clock speed can be pushed even further; when overclocking we managed to push the GPU all the way to 995MHz! Amazingly we almost hit the 1GHz barrier *on the stock cooler,* and we could even

up the memory speed to 1060MHz for an effective speed of 4240Mhz. This is incredibly tough performance, especially considering the bottom-rung price for the card.

Keeping things cool while under this kind of load is no easy feat, and thanks to the recently redesigned stock cooler this is pulled off admirably. It's comprised of a chunk of copper that mounts directly over the core, pulling heat away quickly to a series of aluminium fins while three thick heatpipes pitch in at the same time, getting all the 190W-worth of heat out of there as fast as possible. A big squirrel-cage fan at one end pulls in plenty of fresh air, and most of the heat is vented out the back of the case via the PCI slot. In place of the usual anime girl is a Lara Croft clone (subtly tweaked to avoid copyright of course), but otherwise the card is pretty standard to look at.

Power is provided through two identical PCIe 6-pin connectors, while the twin Crossfire nipples at the top allow up to three of these cards to be used in some enthusiast mobos. Two DVI ports round out the expansion options alongside an analogue out, and the cooling fan is powered by a 4-pin PWM cable that gives

you total control over speed (and therefore noise and cooling). We measured an idle temp of 54 degrees at 60.1dBA, and a load of 65 degrees at 68.2dBA, which is pretty good considering the heat it has to deal with; just make sure you've got plenty of case airflow to get fresh air to the card.

All this would be rather pointless without performance to back it up, but thankfully this is one area where the card isn't lacking. It returned a stable average 60-ish fps in Crysis, 100 fps in GRID and a buttload of points in both 3DMark programs, which by all measures is more than enough performance for the most demanding of single-core-loving Atomicans out there. We benched the card again at the max overclock we hit, and got a score of 18,202 in 3DMark06.

With a bundled copy of PowerDVD 7 and overclocking prowess to tuck under its belt, the Sapphire 4890 is a very solid choice that's sure to please. **JR**

Sapphire 4890 *3d Mark scores*

	Score
3DMark 06	17497
3DMark Vantage	P11354
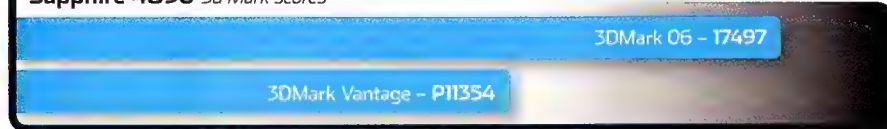
Score

Sapphire 4890 *Gaming Benchmarks*

Crysis
- Average – 59.86
- Minimum – 45.85
- Maximum – 69.49

Race Drive: GRID
- Average – 99.20
- Minimum – 68.00
- Maximum – 123.00

Frames per second

Performance **95**
Nice at stock, great overclocker.

Bundle **75**
You get what you pay for.

Value **98**
Astoundingly good.

Build **88**
Loud at times, otherwise acceptable.

Overall
Sapphire's 4890 is our new favourite high-end overclocker.

95%
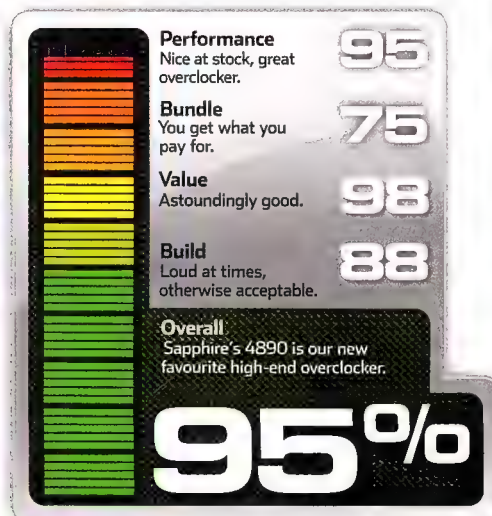
XFX 4770

The most impressive reference cooled overclocking core we've seen!

Street Price $155   **Supplier** XFX
Website www.xfxforce.com

Specifications 750MHz core; 800MHz memory (3200 effective); RV740 core; 640 shader units; 512MB GDDR5; 128-bit memory interface; dual slot PCB with active cooling; 6-pin PCIe power connector

Card info www.techpowerup.com/gpuz/cfpdf/

25% OC

Graphics card overclocking is no recent phenomenon for Atomic, as we've been doing it since before we even left the womb. But what astounds us about this card, as we'll explain in a minute, is that it can overclock exceptionally in ways that back in the day we'd never dream of. First things first though, so let's look at the tech running inside this $155 budget card as it runs up against NVIDIA's 9800GT.

The 4770 is built around the incredibly new RV740 core, the very first desktop core to be manufactured entirely in a 40nm process. Yes – this is a smaller size than even the top Intel/AMD chips can manage! It's got only 640 shader units when compared to the higher-end cards, but they're still clocked at a respectable

Slicing the pie

Silicon wafers currently used in production are 300mm in size, which give a surface area of 109.6 inches squared, or 2783.84mm². Considering the size of the RV740 is 137mm², this means that roughly 20 cores can be produced on a single wafer – compared to the G92b core in the 9800GT at a size of 230mm² and only 12 dies. It's obvious to see how the price is so low when they're squeezing more dies from the same cost wafer!

750MHz. The budget angle of the card means that the memory has also been cut down to only a 128-bit memory bus, but this is paired with 512MB of GDDR5 memory at 800MHz, giving a very good amount of bandwidth for a much cheaper price. Smaller memory buses mean simpler PCBs, and even less to get in the way in terms of electrical interference.

When we sent out our feelers, XFX responded immediately and sent us their version of the 4770 which not only comes with a decent dual-slot cooler but is actually the cheapest one on the market! It's a very special beastie; treated to XFX's typically premium black PCB coating, darkened PCI bracket and red accentuated DVI ports. The sticker on the card is colourful and tells you everything you need to know, removing any chance that you'll get confused as to which card it is.

Cooling is handled by a large aluminium base that contacts the very small die (only 137mm2) and rises simply into a series of aluminium fins. One 70mm fan at the end brings in plenty of fresh air, which is guided by the plastic shroud and exhausted at the back of the case. The Qimonda memory chips remain sadly uncooled by any heatsink, and they became quite toasty

when overclocked, so make sure there's plenty of airflow inside the case. Idle temperature was a low 45 degrees at 56dBA, which rose to 58 degrees with momentary bursts to 69dBA; most of the time it remained at the lower 56dBA level.

We got to overclocking the card itself, and pushed it as far as we could take it on this reference cooler... This reference, aluminium, no heatpiped cheap little cooler. Boy, it impressed us. We hit a final core speed of 934MHz, an astounding *25 per cent increase!* For such a budget card we certainly didn't expect anything near this awesome a result, and we even managed to eke out an extra 40MHz for the memory at this core speed!

Performance is incredibly attractive too for such a cheap card; priced identically to the 9800GT this card outperforms it across the board. Crysis was more than playable, both 3DMark benchies ran very well and even GRID did fairly well at the huge res we bench at (though there was some slowdown during cornering, thanks to extra smoke and other effects).

The bundle is nonexistent, at only a few cables and driver disc, but the real gold here is the RV740 core. We can only imagine what the future for graphics cards will bring when we move to this process; until then the XFX 4770 is a bloody good choice for any enthusiast or gamer. **JR**

XFX 4770 *3d Mark scores*

3DMark 06 – 12706
3DMark Vantage – P7954

Score

XFX 4770 *Gaming Benchmarks*

Crysis:
Average – 40.90
Minimum – 30.44
Maximum – 45.98

Race Driver: GRID:
Average – 53.29
Minimum – 25.00
Maximum – 70.00

Frames per second

Performance 95
Nice at stock, best overclocker we've seen yet.

Bundle 75
You get what you pay for.

Value 98
Astoundingly good.

Build 88
Loud at times, otherwise acceptable.

Overall
This is the perfect card for any budget overclocker or gamer!

95%

MSI GTS250

Fanciful design; utilitarian cooling.

Street Price $260 **Supplier** MSI
Website www.msi.com

Specifications 738MHz core; 1100MHz (2200MHz effective) memory; 1836MHz shader; G92 core; 128 stream processors; 1GB GDDR3; 256-bit memory interface; dual-slot active cooler; one six-pin power connector

Card info www.techpowerup.com/gpuz/3edxk

If you asked us if we've looked at many GTS250 cards, we'd simply point you at the giant pile of cards ranging from the 8800GT/GTS all the way to now – covering a span of over a year and a half of cards built around essentially the same core. This is a little silly to us; be under no illusions that this is in any way 'new' – it isn't. It is, however, a new iteration of a similar theme in that it has an aftermarket cooler – but is that enough to make it worthwhile?

This card runs the G92 core, built on the 65nm manufacturing process that seems relatively ancient in light of the more recent 40nm and even 55nm processes. It's got 128 stream processors to work through the load in a relatively quick way, but is still far behind the 240 processors in a GTX285. Clocked at 738MHz on the core and 1100MHz for the 1GB of GDDR3 memory, this screams reference in every way possible. Why anyone would whack aftermarket coolers on these cards without even a little tuning remains a mystery, but at least the 256-bit memory bus gives a decent amount of memory bandwidth.

Physically the card looks quite striking, sporting a dark red PCB with an array of solid capacitors and other SMD devices. Dominating the majority of this card is the heatsink; a dual-slot job with a thick copper base and four 6mm heatpipes. These meet with a series of aluminium fins directly over the core, as the heatpipes snake out to reach the outer

extremities of the same aluminium fins, which should offer excellent distribution of thermal energy. A centrally-mounted 80mm fan spins at up to 3500rpm and is claimed to be quieter than the stock cooler, but we recorded an idle noise of 53.4dBA and a load of 67.2dBA – seven dBA louder than the reference noise we'd recorded in Issue 100. The good news is that it cools the card pretty well, keeping an idle of 47 and a decent load temperature of 60 degrees Celsius.

Power needs are fulfilled via a 6-pin PCIe power connector, and outputs are handled by two DVI ports. Twin SLI nipples on the top of the card allow up to three cards to be used in tandem. Power regulation at the end of the card is cooled by a small golden heatsink, with delicately shaped fins that channel the airflow up and away from the card.

As with all cards that come through the Labs we sat down and got to pushing this one, hitting a maximum stable core clock of 837MHz (+13

per cent) and a memory speed of 1129MHz (+ three per cent). This is pretty good for the core, though noise at load became irritating. Memory chips are also not cooled by a heatsink, making any memory overclocking trickier than keeping a flame alight underwater. Suffice to say they became quite toasty under load.

Performance of this card is exactly the same as any reference card based around this core – returning decent Crysis, GRID and 3DMark scores. It remains unexceptional here, but for most people out there it's still beefy enough to handle most loads. The bundle of the card is disappointingly small, and contains only the cables needed to run the card without as much as a game or interesting freebie thrown in.

Pricewise this is a pretty unattractive proposition, coming in at about seventy bucks more than a reference 512MB version, and about forty more than a competing 1GB version. With a loud cooler and limited bundle, this unfortunately means that the card has about as much appeal as a flaming edgar. Steer clear. **JR**

13% OC

MSI GTS250 *3d Mark scores*

3DMark 06 – 15722

3DMark Vantage – P8183

Score

MSI GTS250 *Gaming Benchmarks*

Crysis
- Average – 46.63
- Minimum – 34.80
- Maximum – 54.87

Race Driver: GRID
- Average – 58.04
- Minimum – 48.00
- Maximum – 67.00
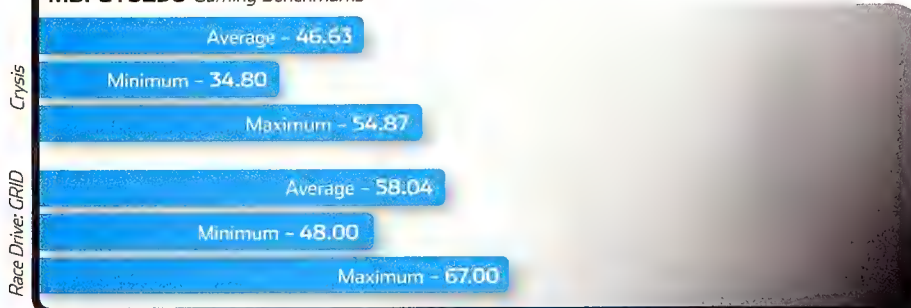
Frames per second

Performance — Overclocks nicely, otherwise average. **79**

Bundle — Small amount of cables, no game. **68**

Value — Not a very attractive proposition. **63**

Build — Cools well, but loud. **78**

Overall — It's a good try, but too expensive for not enough. **71%**

ASUS 4870X2 Trifan

A quirky behemoth of a card with an awkward name.

Price RRP$1099   **Supplier** ASUS
Website www.asus.com.au

Specifications 750MHz core; 900MHz memory (3600MHz effective); RV770 core X 2; 1600 shader units; 2GB GDDR5; 256-bit memory interface; triple slot PCB with active cooling; 6-pin and 8-pin PCIe power connectors

Card info www.techpowerup.com/gpuz/u9dmy

10% OC

We haven't had a look at a 4870X2 card since Issue 96 (the one we described as gilargically hunourmous), but when this triple-fanned beast from ASUS came out we knew it was time to revisit familiar ground. There's a lot you can achieve with the stock cooler, but with three fans you technically should achieve even more while being quieter – at least on paper.

Just like every other 4870X2 out there, this one is built around two identical RV770 cores manufactured on ATI's very reliable 55nm process. Each has 800 shader units clocked at reference speeds of 750MHz, a total of 1600 that should allow greater (theoretical) performance and throughput. The memory subsystem is impressive here as well, with two gigabytes of GDDR5 memory being fed by a 256-bit wide bus. As this is the slightly older core, it does not have the Decap ring featured in the RV790XT core, meaning that higher clockspeeds will be harder to maintain.

Physically this card is almost as big as the one we mentioned earlier; it's 10.5 inches long with a triple-slot cooler that takes up two expansion slots (and renders a third unusable). Two identical thick aluminium heatsinks are pressed against each core, rising upwards into a series of fins that provide a huge surface area for the heat to be dissipated. Each fin is not a solid part of the aluminium base however, instead being individually soldered on; this should still provide

a decent path for heat transfer. No heatpipes have been used at all, instead relying on the three huge 80mm fans mounted in the black plastic frame to push a huge amount of air through the heatsinks. Memory chips are also cooled by these heatsinks, and the remainder are treated to a large metal plate on the back side of the PCB.

All this would suggest plenty of headroom for overclocking, but the lack of a factory overclock is a little puzzling. We managed to push the core by ten per cent and hit a stable maximum of 827MHz, with memory speeds only hitting a four per cent increase of 940MHz. Temps at idle were a very chilly 40 degrees at 58.1dBA, load hitting 59 at 73.2dBA. This is a huge noise increase over the stock cooler (67.5dBA), but temps are twenty degrees lower. We found the card to be quite finicky when overclocking for some unknown reason, producing graphical errors during some 3DMark runs at just slightly over the max stable speed – but being oddly bereft of them during others under the same

load at the same clocks.

Power demands remain the same with one 8-pin and one 6-pin PCIe power connector needed, while only a single Crossfire nipple allows up to one other card to be used here in TriFire or QuadFire. Two DVI ports with an analogue video out give us the pretty pixels, while the PCIe V2.0 connector at the bottom gives plenty of bandwidth for a compatible mobo.

Performance of the card is very good, hitting consistently high frames and scores across all our benchmarks, not even flinching at GRID while running at 1920 x 1200 res with 8xAA. There is no game included, only the basic cables and a leather CD wallet.

This brings us to the biggest downfall of this card – the price. It's got an RRP of $1099; for that price you'd expect three games, an engraved custom nameplate and at the very least exceptional overclocking prowess. What we get instead is a grossly overpriced card with a lightweight bundle and merely decent overclocking. If you're looking for a 4870X2 and don't have a bottomless pit of money, we suggest you look elsewhere. **JR**

ASUS 4870X2 Trifan *3d Mark scores*

3DMark 06 – 21248

3DMark Vantage – P13343

Score

ASUS 4870X2 Trifan *Gaming Benchmarks*

Crysis
Average – 63.55
Minimum – 37.75
Maximum – 85.87

Race Drive: GRID
Average – 144.072
Minimum – 114.00
Maximum – 176.00

Frames per second

Performance Two cores work fast, overclock okay.	93
Bundle Cables and a CD wallet, no game.	74
Value You'll feel ripped off.	42
Build Very loud, but cools well.	81

Overall Good performance, absolutely terrible price tag.

79%

Zotac GTX275 AMP! Edition

AMPed almost to bursting.

Street Price $510 **Supplier** Zotac
Website www.zotac.com

Specifications 702MHz core; 1260MHz memory (2520 effective); GT200 core; 240 stream processors; 896MB GDDR3; 448-bit memory interface; triple slot PCB with active cooling; dual 6-pin PCIe power connectors

Card info www.techpowerup.com/gpuz/6mxms/

4% OC

Zotac has been reknowned for its overclocked graphics cards, setting factory clocks much higher than the other vendors in the same space and usually providing a great bundle on top of a nice warranty and other features.

Built around the new-ish GT200 core, this card features the full complement of stream processors at 240 while borrowing a slower memory bus of only 448-bit. This is paired up with 896MB of GDDR3 memory, and is roughly penned as a hybrid between a GTX285 and a GTX260 – or more accurately a GTX295 chopped in half. It's built on a 55nm manufacturing process, but the die is still phenomenally large at 487mm2. Core clocks sit at an impressive 702MHz (up from a 633MHz reference), while memory speeds are at 1260MHz (up from 1134MHz). This is a pretty high clock for a card to ship at!

Unfortunately while it's got good clocks out of the box, this also means that we could barely squeeze more than four per cent out of the core and three per cent out of the memory, which precludes the card from those looking to have some overclocking fun. This isn't a bad thing – a huge amount of people shy away from overclocking but still want the best performance they can get (if you know someone like this, educate them in the wonders of overclocking!).

The card itself has been treated to a svelte black coating on the PCB that gives it an understated feel of quality, while little extras such as a rubber cap for the SLI nipples and two PCIe connectors add to this. It's got a reference cooler whacked on it, complete with a dragon on the front. A large copper base rises up into a series of aluminium fins, as three heatpipes move the heat away from the core as it churns out a TDP of 219W. The aluminium fins are reinforced by aluminium rails that run the length of the card, which are needed thanks to the large size of the card. It's slightly warm at 49 degrees idle, and 61 load, generating 55.5dBA and 61.3dBA respectively. Also present is that same Crysis high-pitched noise issue that some cards seems to have, which we believe comes from the power regulation and is only apparent during parts of the game with framerates over 70.

Bundled in with the card are all the cables you'd need to run it, as well as a full copy of GRID. This is a great choice, as many people still haven't discovered this little racing gem – with the added benefit that it runs like a stallion on this card. A minimum fps of 73 was recorded under testing, meaning that even under the heaviest load you'll never notice it dropping frames and becoming choppy. Even the usually taxing Crysis performed quite well, averaging well over 60fps.

Thanks to the large overclock already whacked on this card, both 3DMark benchies did especially well, bringing in an extra couple hundred points over reference cards. All this extra performance and bundle comes with a premium pricetag however, rocking in at about a hundred and twenty bucks over the lowest-priced reference cards that you can simply overclock yourself.

Ultimately with this Zotac card you're getting everything done for you, and if you're unsure about messing around with clocks or simply don't care for it, then grab this card. If not, look for the Galaxy GTX275 card from last issue. **JR**

Zotac GTX275 AMP! edition *3d Mark scores*

3DMark 06 - 18259
3DMark Vantage - P14900

Score

Zotac GTX275 AMP! edition *Gaming Benchmarks*

Crysis
Average - 64.91
Minimum - 43.25
Maximum - 82.11

Race Drive: GRID
Average - 95.56
Minimum - 76.00
Maximum - 116.00
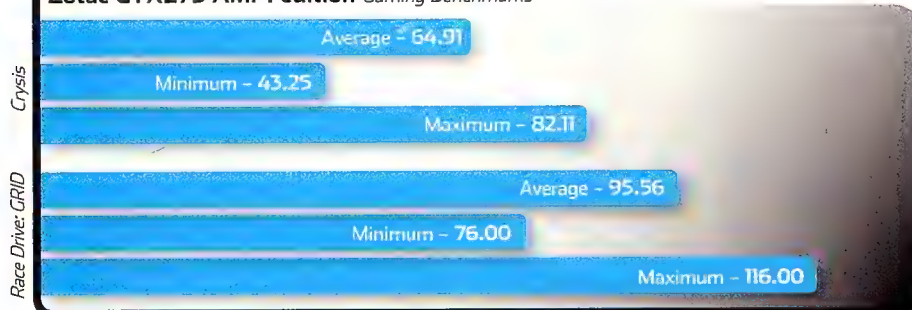
Frames per second

Performance Very nice clocks, limited headroom. **92**

Bundle Cables, and GRID. **93**

Value A tad on the expensive side. **72**

Build The stock cooler does okay. **80**

Overall It's a very solid card, but overclockers look elsewhere.

85%

atomic

G.Skill π series Triple Kit

Everyone enjoys a slice of pie.

We've not looked at much from G.Skill before, but its latest pi series of memory kits seemed to be on the level so we grabbed three identical 2GB sticks and whacked them into our test-rig to see how they went. They're priced at the cheaper end of the DDR3 market, but the specs are nothing to sneeze at and are even better than some of the bigger players!

They run at PC3-12800 speeds, which equates to a speed of 1600MHz. This runs at latencies of 8-8-8-21 @ 1T, with a lower voltage of only 1.60V as opposed to the usual fare of 1.65V. Lower voltage means slightly lower temperatures, and the sticks were quite cool even under load.

Cooling is taken care of by a large aluminium heatsink on top of the sticks that looks sort of like the binder you'd find on some folders. It's pinched at the top, and presses against the eight memory chips on both sides of the PCB to provide a good contact – just make sure you've got plenty of vertical clearance around them, as they're very tall. Performance at the stock clockspeed was very nice, and even when tweaked down to lower latencies the sticks ran admirably. Each has their benefits, but as we've found in testing time and time again your best bet is a mix of high frequencies and lower latencies – a good compromise is somewhere around 1600MHz and 7-7-7-21 timings, which this kit hit easily.

There's quite a bit of mileage to be tweaked out of this pi, and while they mightn't be the best to look at they're certainly attractive to a thin wallet, at only two hundred bucks for six gigabytes of fast memory. With no reason to skimp on memory any more, the G.Skill pi kit is a great choice that will keep budget-conscious tweakers very happy. **JR**

G.Skill π series Triple Kit

	1600MHz; 8-8-8-21 (1T); 1.60V – Stock	1333MHz; 6-6-6-187 (1T); 1.7V
Hexus PiFast	24.38s	24.51s
wPrime 32M 8x	7.051s	7.098s
Everest Read	18370 MB/s	15329MB/s
Everest Write	14528 MB/s	12533 MB/s
Everest Latency	49.5 ns	48.4ns

Overall
Not the best, but great value.

89%

Solidata K5-64 SSD

Definitely not a liquid.

Solidata is a relatively new player in the solid state scene, being recently brought into the country by Solid State Central. While the company looks for resellers to get the drives out there, we're gonna look at the drives themselves to see whether or not they stack up.

The K5-64 is an SLC-based (Single Layer Cell) drive that has 64GB of speedy flash chips inside, something uncommon for a drive of this size. While it does drive up the cost a little, it also means that the longevity and speed of the drive should remain consistent during the lifespan. Since most SSDs are rated for around ten years, it's a good thing to have – even if 64GB will inevitably seem puny ten years from now.

Built into a classy brushed aluminium case, this drive didn't warm up under use at all. It gave impressive average read speeds of 218.5MB/s, burst of 186.4MB/s, access of 0.1ms, average write when copying Program Files over of 115MB/s and an impressive 190MB/s write when copying the Crysis install folder. If you've read Dan Rutter's piece on harddrive speed (this issue if you haven't), which means that compared to all drives we've looked at barring Intel's fastest, this outperforms them significantly under the same conditions.

It's also running the Indilinx controller that saw use in the OCZ drives we've looked at in the past two Issues, but the SLC memory chips allow extra performance to be squeezed out.

You can grab one of these for the large pricetag of $859 out in the wilderness, which might seem high compared to other high-capacity drives, but at least this one can offer good performance with more than enough room to fit an OS and accompanying games. **JR**

Overall
Respectable performance, high price.

82%

Thermaltake ProWater 880i

A convenient way to get wet.

Street Price $330 **Supplier** Anyware
Website www.anyware.com.au

Specifications Copper universal waterblock; 500L/h pump; 350ml reservoir; dual rad with two 12cm fans; Flow TX water meter; 1L coolant; 4m 3/8 UV reactive tubing; iStripe.

Watercooling systems are something that a lot of enthusiasts dream of, hope for and fantasise about – after all they do offer certain things that standard heatsink cooling can't offer. There are a lot of misconceptions surrounding watercooling (such as the rumour that they're dead quiet – sure, until you add a pump and fans!), but this is a kit that aims to answer a few of them in a convenient package that includes everything a decent watercooling system should have. We'll start with the price, which is a pretty significant $330, especially when compared to a $90 heatsink that does a similar job. Which is better, and is wetter worth the hassle?

This is Thermaltake's umpteenth attempt at offering a full kit, and is aimed at the highest-end of the cooling market, also known as those with pockets deep enough to tread water in. It's an arrangement of the separate parts of the system and a decently clear manual, all of which are pretested to work together without any part-searching or head-wracking. Some might argue that finding all the parts separately is half the fun, but for sheer convenience this can't be dissed. Compatibility covers socket 478, LGA775, LGA1366, K8, and AM2/AM2+, which is every socket that anyone is running today.

The components

Perhaps the most important part of any watercooling loop is the waterblock, or the lump of metal that mounts directly to the CPU and draws the heat away. The one included with the ProWater is a Thermaltake branded copper block, which is a simple in-out block with a small cavity in the centre. Liquid flows through a series of copper pins inside, and exits with the heat. A universal mounting bracket is preinstalled from the factory on top, and the base is flat – if a little rough.

The second most important part is the pump, and again it's a Thermaltake one rated at a very impressive 500L/h. It's got ceramic bearings inside it, so should last for about 30-40,000 hours (it'll make an ungodly noise if it begins to fail). While running it made 54.2dBA of noise, which is pretty quiet considering the volume of liquid it pushes. Hooked directly into the pump is the reservoir, which holds 350ml of liquid and provides the pump intake with a large source of liquid – getting air into your pump while it's running is fatal in a very short time, so do your best to make sure it stays well-filled.

Third most important is the radiator, in this case a simple dual-slot rad that takes the water up and down its length one time. A series of small aluminium fins contact with the water pipe inside, taking away the heat to spread over a very large surface area, as the two 12cm fans blow it away. These fins are very fragile and even a waywardly overenthusiastic fingertip can bend them, so be careful when moving it around. One cool feature about this radiator is that it comes with a plastic mounting frame, meaning that this can be attached to the rear of a standard ATX case – completely externally. Otherwise this frame can be removed, and the radiator installed as per normal.

The fans are standard Thermaltake models, with orange blades and black frames. They're hooked up to a variable rheostat to control the speed, and their noise ranges from the almost quiet 57.9dBA all the way to the annoyingly

There's a nifty flow meter included in the pack; basically a paddle wheel mounted inside a clear plastic bubble.

loud 76.1dBA at full. On lowest setting however, they're very inoffensive. Both the fans and the pump are powered by Molex cables.

There's a nifty flow meter included in the pack; basically a paddle wheel mounted inside a clear plastic bubble. This rotates when the water in the loop is flowing, and is a great way of showing off when installed in a case – most times you can't tell if there's any water moving at all without one! We found it caught a few air bubbles under initial use, but was otherwise functional and cool to look at. Also cool was the four metres of included UV reactive 3/8 tubing, and 1L of UV reactive liquid. Check out the gallery link at the top of the article for detailed pics of all the components.

Installation and temps

Installation on our LGA1366 testbed was pretty simple, and the manual explains things quite well – it just needs updating as the LGA1366 socket wasn't included. It mounts identically to the LGA775 mount, but for beginners it might be confusing. The waterblock goes on first with a series of long screws, holding the waterblock down firmly. Components were laid out in this order:

Reservoir > Pump > Flow Meter > Radiator > Waterblock

The tubing was measured – twice! – and finally

cut as cleanly as possible with a pair of sharp scissors. A quick soak in a cup of hot water for one end was needed to get it firmly on the barb, and a clamp threaded down the tube to hold it securely. Then a clamp was put on the tube in the middle, the end of the tube soaked and installed, and finally the clamp moved to secure.

A quick fill, flicking the power on and off to get the liquid moving around (don't let any air in, remember), and the loop was finally running. We got a very nice result on stock settings, with temps as in the table below, but even when overclocked it was solid. As a final stress test we set the CPU speed to 3.86GHz @ 1.425V, which survived 1.5 hours under OCCT – a very impressive result indeed as it only hit 63 degrees.

While it's not for everyone, the ProWater performs decently for the money and will look good while being simple – but if you're after performance, building your own kit is still the best way to go. **JR**

Thermaltake ProWater 880i

	Stock 3.2GHz		OC'd 3.6GHz 1.375V	
	Idle	Load	Idle	Load
Low Fans	33	48	35	61
High Fans	32	46	35	57

Overall
It's a decent kit, UV reactive and cools well. Win.

85%

OCZ Behemoth mouse

A giant of a mouse, or just a giant pain?

Street Price $75 Supplier OCZ Technology
Website www.ocztechnology.com

The Behemoth features a much curvier design than its smaller cousin (reviewed last issue), with a deep thumb groove on the left-hand side, and two shallower grooves on the right-side to rest your little and ring fingers in. It's also larger (thus the moniker), and sits very comfortably in the palm of your hand. The thumb rest in particular feels very solid, with a small flange at the mouse's base that supports your digit. In actual gaming, though, the grooves for your smaller fingers seemed to be just off; not enough to lead to mousing mistakes, but it certainly felt... odd.

Of course, other hands will vary.

Like most gaming mice, the DPI of the Behemoth can be switched on the fly, in this instance via a one-button toggle that cycles you through the settings you've programmed in. There's also a very easy to reach rocker button under your thumb, and rubbery scroll wheel also features lateral clicking. The wheel itself is very responsive.

But our favourite feature of the Behemoth is its cable and the innovative system for managing it. The cable itself is cloth wrapped and very hard to kink – it's going to take a lot of punishment, and looks classy to boot. There's also a series of channels in the mouse's underside – kind of like what you find under a desktop phone – for you to slot the cable through. There are six positions you can have the cable feed out of the mouse, meaning you can set it up according to your individual desk. Is your mouse cable always bumping the wall behind your desk? Feed the cable to the side and you no longer have a problem.

Along with the now standard system of interchangeable weights, the Behemoth has a lot going for it. It's not our perfect mouse, but it certainly has a good price-point and some very welcome features. **DH**

Overall
About as convenient as a cabled mouse can get.

82%
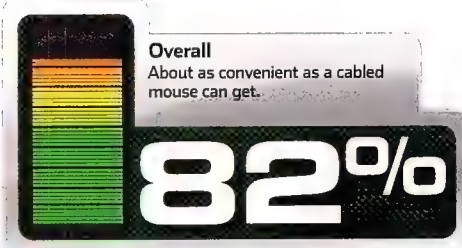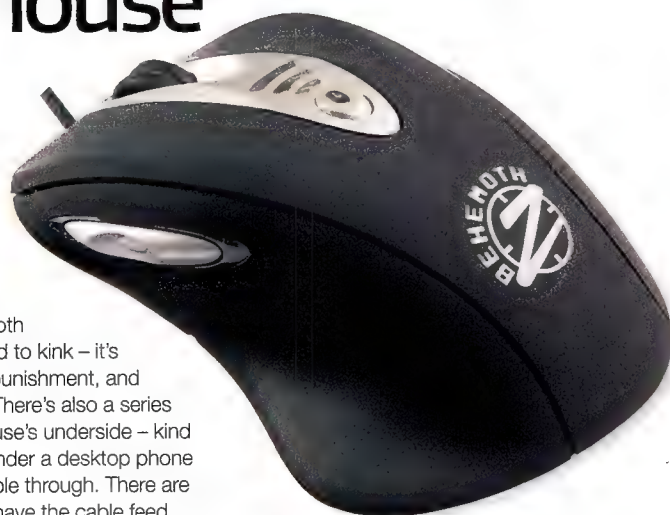
Seagate Barracuda 1TB

The big fish with a terrible bite.

Street Price $180 Supplier Seagate
Website www.seagate.com
Specifications 1000GB; 3.5in form factor; SATA 3Gb/s

Harddrives are the backbone of modern computing, and give us a relatively easy-to-use storage medium to keep all our bits and bytes in. They started with storage sizes measured in minutiae, but have grown ever increasingly huge. This one is the very latest in Seagate's well-known Barracuda series, rounding up the twelfth generation of harddisks to give us the 1TB monster that we've got on test.

It uses perpendicular recording to squeeze all 1000GB of data onto only two platters compared to the usual three, which is essentially a way of standing the ones and zeroes up on their ends to pack more into the same physical space. That particular method was limited by the drive head's sensitivity levels, but is now at a stage where we see it in practically every drive on the market today.

Having only two platters keeps the drive pretty quiet under load – though it still became warm to the touch. It's got a decent speed too; with an average read of 105MB/s burst of 212.5MB/s and an access time of 13.9ms. While copying the Crysis install folder to this drive we recorded an average write of 171MB/s, though the Program Files folder (containing many smaller files) hit an average of only 59.5MB/s.

This speed is pretty good considering the large storage area available in the drive, but compared to competing SSD tech and even Western Digital's Velociraptor series this can seem relatively sedate. It should be more than good enough for an OS drive, but those interested in this will be more likely to use it as a media storage drive – something it will be well suited for. With 5.5GB per dollar spent, this is a very good value option. **JR**

Overall
Good performance and value.

85%

Logitech G19 gaming keyboard

Do you really need a colour LCD on your keyboard?

Street Price $300 **Supplier** Logitech
Website www.logitech.com.au

How far is too far when it comes to gaming peripherals? Given that comparing a gaming device to a normal computing peripheral is akin to comparing a Ford Laser to a Ferrari, that can be a hard question answer. Thankfully, we now have Logitech's G19, which is most definitely too far.

We better hammer this review out pretty damn fast, as no doubt an array of Gods are lining up to punish our decadent civilisation for its over-weening hubris. The old G15 was bad enough, with its greyscale LCD, but the colour one is...

Well, actually, it's a very good little screen, and the info it can show, from PC performance details to newsfeeds and even the latest on YouTube or from your own pic and video files, is kind of handy. But still – ARE WE SO VAIN?

Further, because of the screen the G19 draws mains power. In many books, that's a killer of a proposition right there, as most serious rigs are already drawing a mess of juice from the wall. Not to mention the increase in snaking cables

gathering cat fur and dead cockroaches (or is that only us?).
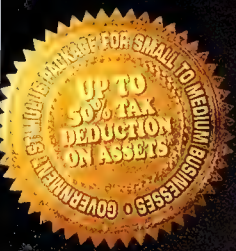
The G19 also comes with a full suite of software for configuring the screen, and for recording and selecting macros, which is probably what makes this keyboard really useful. The interface is one of the easiest to navigate that we've seen, and auto-detects most games – it certainly found our copy of CoD4 without trouble. Sadly, the LCD screen did not display any game data, though. There are only 'dozens' of games supported – though one of those is World of Warcraft, which combined with the macro functionality makes this a pretty good option for serious end-game raiders, PvP gankers, and other socially 'outre' WoW types.

And yet... the price. For the cost of a G19 you could actually get yourself a new monitor – $300 or more is a lot to pay for any piece of kit. For a keyboard it's near extortion. And outside of the

gaming extras the G19's key action is nothing to write home about – so buy this only if you MUST have that bright and shiny screen.
DH

Overall
Kind of neat, but way too expensive.

72%

Logitech G35 Headset

Not included: Duct tape.

Logitech is huge in the gaming market, and most people either own or have used one of their products. First though have a good look at the pricetag just above – two hundred wing-wangs. It's incredibly expensive for a headset, but does it actually have anything to justify the price?

Three metres of thick cloth-braided cable (one and a half tech writers long) hook up the USB connector to the left-hand cup of the G35, ending in a solid plastic mount that should prevent any accidental breakage. There's no capacity for analogue audio at all; you're limited to USB only. This detects and installs fine on XP, but oddly wouldn't playback any sound until manually selected through the Control Panel's sound option – once the included software was installed this wasn't a problem.

The headset itself is rather stylish looking, but unfortunately this is at the loss of comfort and durability – this headset never sat right and any movement of the head could send it sliding off without any warning. This isn't helped by the leather padding underneath the headband, which is incredibly smooth, nor the microphone boom that adds weight to the front. Everything wobbles and bends; nothing on this headset feels solid.

Thankfully the audio reproduction is great, and with dual 40mm neodymium drivers (apparently laser-tuned – pew-pew!) they do a very nice job with music – though the 5.1 Dolby emulation is weak at points, and only seems to increase the bass while selectively pulling out certain instruments. Gaming was nice through them, but without the Dolby it lacked the bassy punch you'd expect. Media controls as well as volume are on the left-hand cup, though knocking the headset off is very easy to do while fiddling around to find the right button.

If you can afford this headset and put up with its discomforting desire to escape your noggin, you'll get solid sound – whether or not it's a good choice is another matter entirely JR

Overall
Poor design, great sound reproduction. Too expensive.

74%

Logitech G9x mouse

Logitech goes in some interesting new directions with its latest gaming mouse.

Logitech's gone with a 'more of the same' approach with its new G9x gaming mouse. It shares much of the design flare of the G9, and adds only a few minor evolutionary improvements -- the most important of which is that tracking on the mouse now goes up to a bewildering 5000dpi.

We've always thought the G9 to be a little off-song for a gaming mouse, but there's no denying its popularity. Certainly, the features the G9x shares with it are strong, such as the outer shell, which can be swapped out to create a slimmer mouse, or the button positioning, which is solid and again near-identical. With a cloth-wrapped cable and slightly rubber-feeling (not actually rubberised) solid metal scroll-wheel that can be set to normal mode or free-spinning mode, there's no denying that this is a classy mouse.

But...

As I'm typing this review, there's an unmistakable twinge in my forearm from my intense mouse testing session (the dummy cargo-ship training level in CoD4). The mouse is a touch on the small side for what are already not the largest of hands, which led to a claw-like grip being needed to control fine mouse movements – there simply isn't adequate surface area on the mouse's right-hand side. And the slightly rough surface is actually harder to grip than you'd expect. After a bit of use it becomes kind of waxy and prone to slipping.

Similarly, there's not quite enough support under your palm to be comfortable – and it's even worse with the larger housing removed. Perhaps it's just our mousing position, but with our hand resting naturally on top of the G9x a lot of the secondary buttons are rather hard to reach, adding further to the sense of impending arthritis.

Still, gamers with smaller hands or who like the option to switch down to a smaller pointing device will like it, and G9x's software – if you bother with such things – is certainly easy to use.

All in, however, it's not going to come close to shifting Microsoft's latest Sidewinder. DH

Overall
Not quite our cup of mousing tea.

70%

Coolermaster HAF 922

More HAF, less Hoff, all cooling.

Street Price $190 **Supplier** Coolermaster
Website www.coolermaster.com

Specifications 489 x 219 X 495.5 mm (WxHxD); 8.7kg; 5x 5.25in drive bays, 6x 3.5in drive bays (including one exposed for floppy drive); 1x 200mm fan (front), 1x 200mm fan (top), 1x 120mm fan (rear); 2x USB2.0, 1x eSATA, 1x Mic; 1x HD Audio+AC'97; ATX/mATX form factor; steel, ABS plastic and mesh construction.

Gallery www.atomicmpc.com.au/?144835

As you may be able to guess, the HAF 922 is a smaller and more budget oriented version of the HAF 932 reviewed back in issue 93 (and online here: **http://www.atomicmpc. com.au/?127136**). So by turning a shrink ray onto a case that we gave a Hot Award to, has Coolermaster done the HAF any lasting harm?

Outwardly, it appears not to have hurt at all. This HAF still has that same black, semi-industrial look and feel of its bigger brother, with a mix of matte and gloss finishes on the plastic and metal exterior. The front fascia is made up of black mesh, which will keep airflow pretty solid, and this is backed up by some fine mesh to keep dust and stuff out of your beloved bits.

The top end of the case front features the IO ports and a small tray-like enclosure perfect for putting screws, discs and other knick-knacks into. The power and reset buttons are plastic as well, but without actually feeling too cheap. We don't know about you guys, but our favourite and first test for case quality is to just press the power switch a dozen or so times – a poor or unresponsive action here usually means a poor case overall. There's also a switch up here to turn the fan-lighting off and on. Handy for stealth gaming sessions.

The 922 has a reasonably narrow profile, but both side panels flare out to make room for internal components; the left panel is further enhanced by cut-out grill, with mountings to for either two 120mm fans or one 200mm model – and there'll still be a lot of clearance for all but the most extravagant of cooling setups.

Speaking of cooling, the 922's stock loadout of two 200mm fans and a single 120mm is more than adequate, and at least there's room for more fans and even a slim watercooling rig if you really want to overclock like there's no tomorrow. There are two comfortably sized rubber grommets at the case rear. The last cooling touch is a vertical expansion slot just in front of the seven main horizontal ones, where you can fit a fan controller. The case may be on the medium side, but it's still thoroughly enthusiast-grade.

That impression is only enhanced by the interior. It's as roomy as you could want, with an impressive amount of clearance behind the motherboard plate – this will make cable management relatively straightforward, further increasing airflow potential. The 922's 5.25in bays are all secured using Coolermaster's usual push-button tool-less approach, and the 3.5in drive bays are similarly tool-less in design. It's no doubt a cost-saving measure, but the 922 thankfully does away with any fancy guff when it comes to securing expansion cards – there's just good old fashioned thumb screws. Hallelujah.

Given the original HAF now costs about $230, this is a nice alternative if you like that aesthetic but are watching your wallet. It's got a good mix of features without being too clever for its own good. Well done once again, Coolermaster. **DH**

Build Solid, with little frills. **76**

Value Good cooling for the money. **82**

Cooling Good airflow and fan choices. **86**

Features Nothing fancy, but very solid nonetheless. **80**

Overall A good choice for the size or budget conscious. **83%**
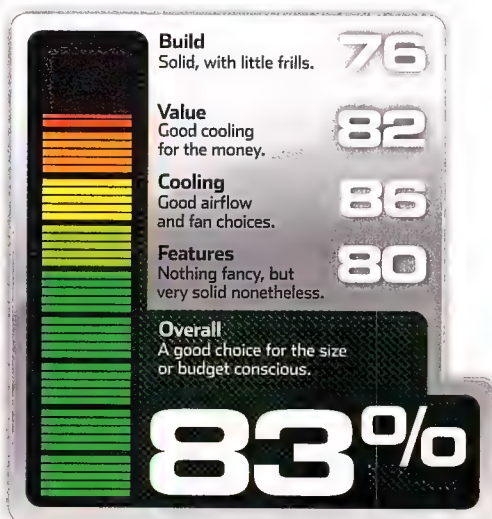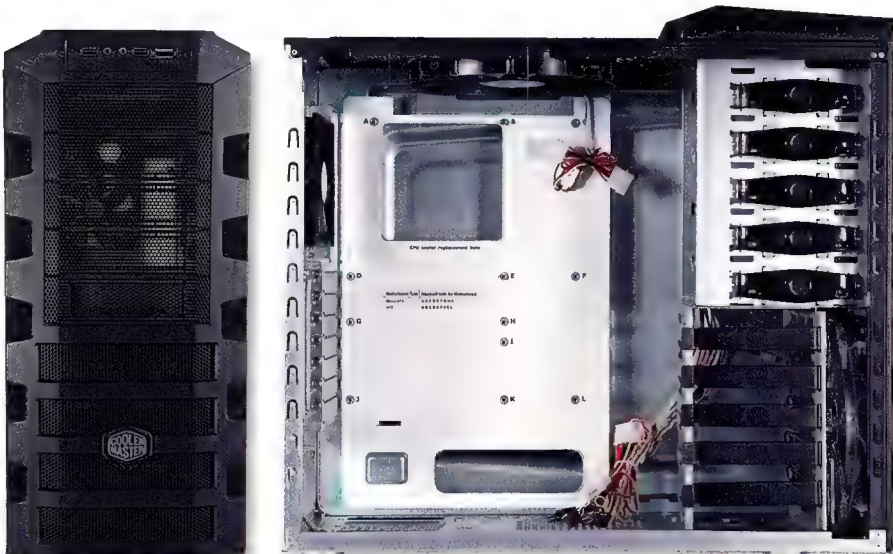
Antec P183

This luxury case has everything bar the kitchen sink – and you could mod that in!

Street Price $300   **Supplier** Altech
Website www.altech.com.au
Specifications 514 x 205 x 590mm (HxWxD); 16.25kg; 4x 5.25in drive bays, 7x 3.5in drive bays (one external for floppy); 2x 140mm fan (top), 1x 200mm fan (side), 1x 120mm fan (rear); 2x USB 2.0, 1x eSATA, 1x HD Audio/AC97; mATX, ATX and eATX compatible; steel, polycarbonate, plastic and aluminium construction.
Gallery www.atomicmpc.com.au/?144144

Weighing in at nearly 15kg out of the box, and just generally large no matter how you measure such things, the Antec P193 is a true beast of a case. But that's not to say that weight is a bad thing, because the minute you start poking about the P193's innards you start to see that you really are getting what your sorely abused back muscles are paying for.

Externally, with the exception of the mount for the side-panel fan, the design is classic P-series – very square and kind of plain. The case is mostly plain black plastic, externally, with the odd shiny highlight on the front enclosure, a door that swings away to reveal drive bays and the first of the luxury-grade touches you'll discover in this case.

Each bay has its own pop-out cover, and each cover is filtered by a fine mesh screen. Behind the fascia there are two unused 120mm fan bays, and each of these also has a pop-out mesh cover. This is a great touch for those who shun dust in all its forms, and will keep the interior of your case as pristine as the day you built it. Here you'll also find the pleasingly solid power and reset buttons, and the IO ports.

The top of the case is more plain black plastic,

and so's the right-hand panel. The left-hand panel, as you can see in the photo, features a protruding fan housing with attendant 200mm intake fan. This might seem an odd design choice, but it does leave the interior wonderfully uncluttered; this fan also has a slide-out mesh screen, once again making clean freaks weak at their immaculately clean knees. The rear of the case houses all the usual bits, as well as external controllers for the rear and top-most fans – a nice touch for those who like to ramp up fan speed (and ramp down noise) as necessary.

You might be worrying about all these plastic panels, but this is where the P193's weight starts to make sense – each panel is a composite of metal and plastic. When you get inside you'll also spot a lot of rubber dampeners, gel grommets and more; this case is designed with ultimate silence in mind, and it delivers. Further, if you want to add more fans, there's room for two at the front, and internal mounts as well to make sure air flows where you want it to. It's a very versatile setup, made even cleverer by a compartmentalised design that keeps the PSU separate from more thermally delicate components. Cable management is

a dream thanks to many hooks, catches and cable runs; the P193 is beaten only by the Thermaltake Spedo in terms of neatness and efficiency.

Antec's design in the P-series is certainly striking, and while it may not be for everyone there's no doubting this is one of the neatest and quietest cases we've seen. If you want enthusiast-grade space with HTPC-grade silence, this is what you've been waiting for. **DH**

Build 89
Tougher than a brick outhouse.

Value 80
Expensive, but silence can be worth it.

Cooling 90
Well considered and versatile fan choices.

Features 93
Great sound-proofing and design.

Overall
Not for everyone, but a great case nonetheless.

90%
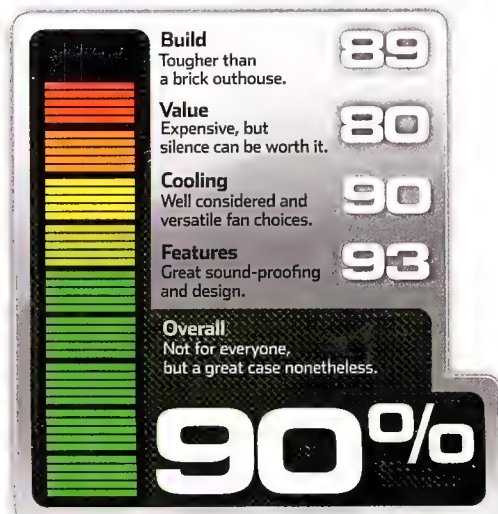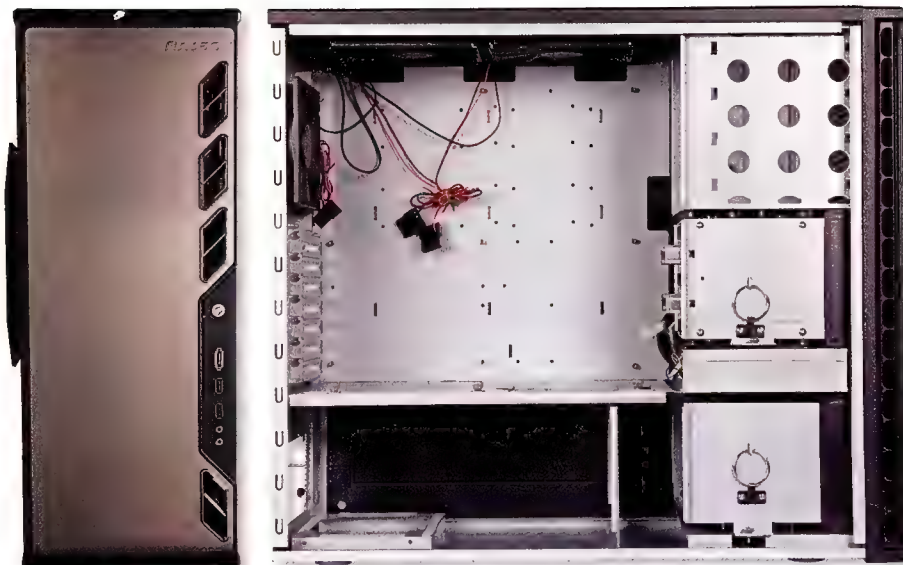
Nirv i7 Pro SLI

Is this the fastest machine we've ever seen in the labs?

Street Price $5895   **Supplier** Nirv Computers
Website http://nirv.com.au

Specifications Intel® Core i7 920 2.66GHz (overclocked to 4GHz); 6GB DDR3 @1600MHz; Thermalright ULTRA-120 eXtreme with 120mm Fan; 2 x NVIDIA GeForce GTX 295 1792MB GDDR3; 300GB VelociRaptor @ 10,000RPM & 1.5TB HDD 7200rpm; Blu-Ray & HD-DVD Combo Drive; 1000 Watt PSU; Antec Twelve Hundred ATX case.

We've looked at a Nirv system before, and we've grown to know the company for its neat builds, well-specced systems and consistently solid overclocks out of the box. They're nice guys, too! And, we've discovered after looking at this system, absolutely stark raving insane.

In a mostly good way, though.

Nirv's Pro SLI system is built around a Core i7 920 CPU. This runs at 2.66GHz at stock, but the whitecoats at Nirv have bumped this up to an impressive 4GHz. And on air to boot! This pumps out a lot of heat under load, but that's dealt with by a TRUE 120 in tandem with a 120mm fan, and further abetted by an Antec Twelve Hundred case with another five PWM-controlled 120mm fans arrayed around the front and rear. The case is wonderfully roomy, allowing for a large amount of airflow and space to get the heat away from the CPU and out of the case. It's probably one of the better thought out air-cooling setups we've seen for an overclocked rig – simple but very effective.

The other – and this is where the insanity really starts to show – part of the Pro SLI's performance equation is a pair of GTX295s running in SLI. This is pretty much the most powerful combination you can get without robbing Fort Knox for the down-payment; it also brings with it a pretty hefty thermal debt, but again, the Antec case is up to the task of keeping things running nice and cool (ish).

The rest of the spec is similarly solid. The storage sub-system is split between a 300GB VelociRaptor and a 1.5TB Barracuda – a perfect combination of speed for your system drive (and favourite, never-deleting-them games), and immense space for things like movies, music and hi-res satellite spy data. It's a lot of space. There's 6GB of Geil RAM helping data move about, a 1000 Watt PSU to make sure everything runs without falling over for lack of juice, and a very handy – and, again, a little crazy – Blu-ray/HDD combo drive by way of optical storage.
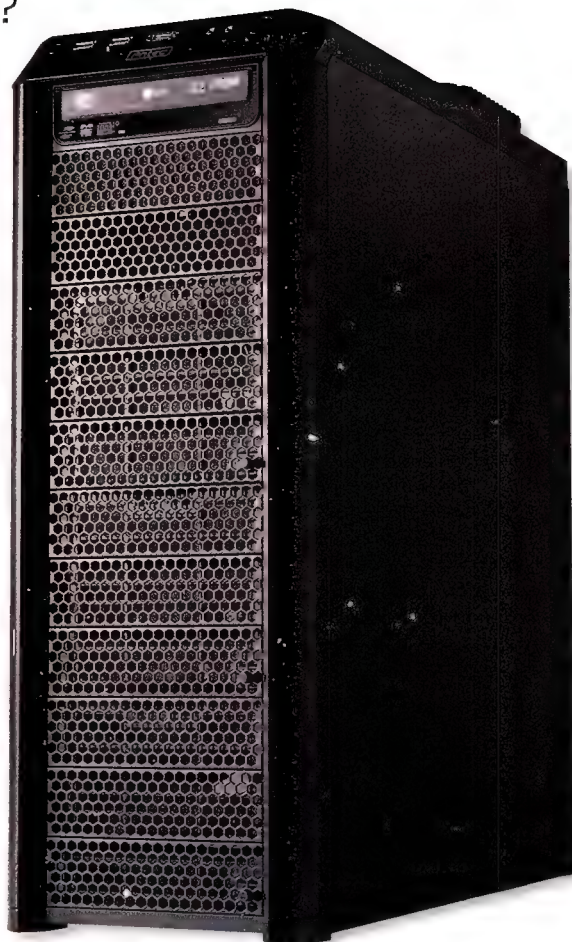
And that's it – this system is box only. Nearly six-grand... for just the box.

Before we criticise, we must admit our benchmarks were pretty bloody impressive. 3DMark Vantage took full advantage of Nvidia's PhysX and returned a phenomenal P35,243; 3DMark06 scored a more scaled back (and slightly more relevant) 24,770 marks. Big bloody numbers.

Our Crysis testing was like watching the game on fast forward; the standard GPU test ran at an impressive average FPS of 76 at our stock settings (see How we Test on page 30). You're paying premium prices, but you're getting more performance than God.

The thing is, you could probably lose one of the 295s without compromising performance all that much. Certainly, you wouldn't get a noticeable degradation – the human eye is a pretty unforgiving bit of meat. Similarly, the combo drive is cute, but hardly necessary. With a bit of pruning you could probably trim a grand off the asking price.

But when you think that our LAN build from last issue would cost only $500 less than the Pro SLI, this system actually starts to look like better value than you might expect. Throw in a one year RTB warranty with free phone support (which we don't expect any self-respecting Atomican to need), and the overclock... this actually becomes hard system to dislike.

Sometimes, insanity really is sexy. **DH**

Performance Just about the fastest we've seen.	**97**
Value Questionable, but a lot of tech.	**81**
Build Good cabling, awesome kit choices.	**89**
Futureproofing Room for upgrades, even watercooling.	**92**

Overall
Probably the rig we'd build ourselves, for an insane building challenge.

89%
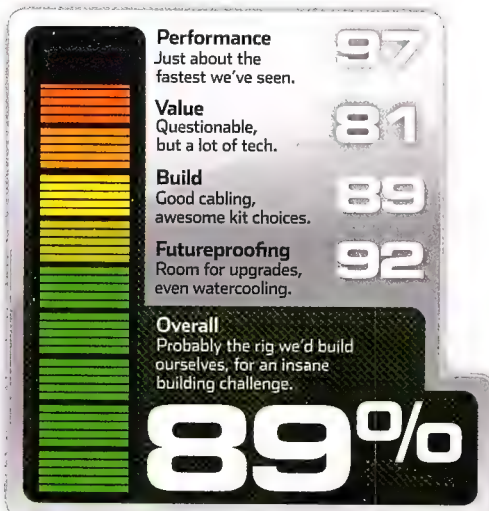
Chilled to the bone

James Gorbold and Antony Leather chill out with some cool heatsink and fan combos.

For the first 11 years of the PC's history, CPUs consumed so little power that they didn't require any extra cooling. By 1989 however, when the 25MHz Intel 80486DX arrived, the thermal design power (TDP) of CPUs had risen so much that a heatsink, or heatsink and fan (HSF), was fast becoming mandatory. Today's CPUs consume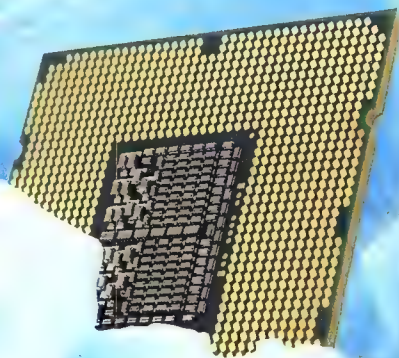 so much power – almost 50 times that of an 80486 – that they require increasingly large and complex HSFs to operate properly.

Although all retail boxed CPUs are supplied with a reference Intel or AMD HSF, these coolers are neither particularly effective nor quiet, especially if you want to overclock. A new HSF should help to make your PC quieter and also lower the temperature of your CPU, prolonging its life and providing more headroom for overclocking. We say 'should' because unfortunately some third-party HSFs are actually worse at cooling than the reference Intel and AMD HSFs. Given that the reference Intel and AMD HSFs are in effect free unless you buy an unboxed OEM CPU without an HSF, any sub-standard third-party HSF should be avoided like a banker in an economic crisis.

To help you choose the right cooling upgrade for your CPU, we've rounded up 11 of the most interesting CPU HSFs on the market. Where possible we tested each HSF in our Socket AM2+ (Phenom II), LGA775 (Core 2) and LGA1366 (Core i7) test rigs, so no matter which CPU you have, there is a choice of several options.

HOW WE TESTED

The single most important characteristic of an HSF is how well it cools your CPU. Effective cooling stops the automatic thermal protection throttling your CPU (which reduces its speed and therefore its performance) or, worse still, automatically shutting down your PC.

For this Labs test we wanted to measure the CPU temperature of our test rigs accurately and scientifically when each new HSF was installed. To do this we used the freeware application CoreTemp (**www.alcpu.com/CoreTemp**). This application reads the temperature of the Digital Thermal Sensor (DTS) embedded in the core of every modern CPU. The DTS gives a much more accurate reading than any third-party temperature sensor because its readings are not affected by sloppy BIOS programming or a poorly calibrated external health monitoring chip on the motherboard.

Even though CoreTemp is capable of displaying the actual temperature of each CPU core, the lack of a temperature control chamber means it's more accurate to measure and quote the delta T between ambient and CPU temperature. This allows us to make fair comparisons between HSFs tested on different days, when the ambient temperature may have varied.

The key question to consider when choosing a new HSF is whether it's cooler, quieter or both than the reference Intel and AMD HSFs. While the reference HSFs are not the best performers, you effectively get them for free when you buy a retail boxed CPU, so a third-party HSF is only worth buying if it's better in some way than the reference HSF.

As there are so many different types of CPU available, we had to build three thermal test rigs to cover the three main platform types (Socket AM2+, LGA775 and LGA1366). The Socket AM2+ test rig comprises a 3GHz Phenom II X4 940 Black Edition overclocked to 3.6GHz with the vcore boosted to 1.6V. The rest of the system comprises an Asus M3A78-T motherboard and an ATI Radeon HD 4870 installed in a Cooler Master Cosmos S case. The LGA775 test rig comprises a 2.13GHz Xeon X3210 overclocked to 2.66GHz by increasing its FSB from 266MHz (1,066MHz effective) to 333MHz (1,333MHz effective) and the vcore to 1.41V. This system is built inside a Cooler Master Stacker 830 chassis along with an Abit IP35 Pro XE motherboard and an ATI Radeon HD 4670 graphics card. The LGA1366 test rig comprises a 3.2GHz Core i7-Extreme Edition overclocked to 3.6GHz with a vcore of 1.3V, MSI Eclipse motherboard and GeForce GTX 280 graphics card installed inside a Cooler Master Stacker 830 chassis.

The temperature results in the graphs were taken once the CPU had reached its maximum stable temperature running the smallfft test in Prime95. The temperatures shown are the delta T between ambient and CPU temperature.

SCORING

Below each review you'll see four separate score boxes, one each for Cooling, Design and Value and an Overall score. The Cooling score shows how well each HSF cooled the processor compared with the reference designs, which scored an arbitrary 50 per cent. We calculated the Design score by awarding a certain number of points for each of the key design characteristics. For example, we penalised excessively noisy HSFs and took into account how well the HSF mounts to the motherboard. We also rewarded HSFs that provide extra cooling for components around the CPU socket. We then derived the Value score by performing a weighted calculation, adding together the Cooling and Design scores and dividing by the price. The Overall score is also weighted and is not a simple average of the three initial scores. For this calculation we used a weighting of Cooling (40 per cent), Design (30 per cent) and Value (30 per cent) as cooling is obviously the most important characteristic of a HSF.

Heatsink feature table

	Arctic Cooling Freezer Xtreme	Cooler Master V8	Gigabyte G-Power II Pro	Noctua NH-C12P	Noctua NH-U12P SE1366	OCZ Gladiator Max
Price	$63.00	$79.00	$79.00	$95.00	$105.00	$85.00
Manufacturer	www.arctic-cooling.com	www.coolermaster.com	http://www.giga-byte.com	www.noctua.at	www.noctua.at	www.ocztechnology.com
Compatibility						
Socket AM2/AM2+/AM3	Y	Y	Y	Y	N	Y
LGA775	Y	Y	Y	Y	N	Y
LGA1366	N	Y	N	N	Y	Y
Specification						
Heatsink material	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium
Heatsink core material	Copper	Copper	Copper	Copper	Copper	Copper
Fan	120mm	120mm	120mm	120mm	120mm	120mm
Fan speed (rpm)	800 - 1,500	800 - 1,800	1,500	900 - 1,300	900 - 1,300	800 - 1,500
Fan speed control	PWM	Manual or PWM	PWM	Manual	Manual	PWM
Stated noise (dBA)	Not stated	17 - 21	23	12.9 - 19.8	12.9 - 19.8	19.6 - 26.4
Power connector	4-pin	4-pin	4-pin	3-pin	3-pin	4-pin
Illumination	N	N	Blue LEDs	N	N	N
Dimensions (mm)(W x D x H)	100 x 130 x 131	125x125x160	124x125x164	126 x 152 x 114	126 x 120 x 158	120x94x159

	OCZ Vendetta 2	Scythe Mugen 2	Scythe Orochi	Thermalright Ultra 120 eXtreme 1366 RT	Thermaltake V1
Price	$69.00	$99.00	$109.00	$109.00	$89.00
Manufacturer	www.ocztechnology.com	www.scythe.com	www.scythe.com	www.thermalright.com	www.thermaltake.com
Compatibility					
Socket AM2/AM2+/AM3	Y	Y	Y	N	Y
LGA775	Y	Y	Y	N	Y
LGA1366	Y	Y	N	Y	Y
Specification					
Heatsink material	Aluminium	Aluminium	Aluminium	Aluminium	Copper
Heatsink core material	Copper	Copper	Copper	Copper	Copper
Fan	120mm	120mm	140mm	120mm	120mm
Fan speed (rpm)	800 - 1,500	1,300	500	1,600	Manual
Fan speed control	PWM	PWM	N	N	1,300 - 2,000
Stated noise (dBA)	20 -32	26.5	10.8	28	16 - 24
Power connector	4-pin	4-pin	3-pin	3-pin	3-pin
Illumination	N	N	N	N	Blue LEDs
Dimensions (mm)(W x D x H)	120x90x158	130x126x156	140x186x181	145 x 92 x 161	147x92x143

Arctic Cooling Freezer Xtreme

Not bad for LGA775 systems, but terrible for AMD CPUs

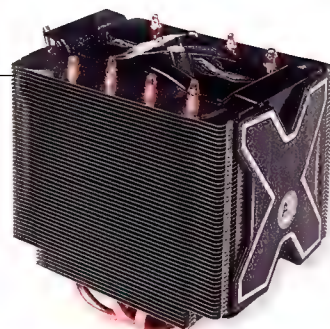**Street Price** $63
Manufacturer www.arctic-cooling.com

To install the Freezer Xtreme in LGA775 systems, you need to fix a retention bracket to the motherboard using four soft plastic pins. This is a particularly poor design because you need to use a pair of pliers to push the pins through the motherboard. The pins are kind of lame and break easily, and you need to be careful that the pliers don't slip and damage the motherboard itself. Once you have securely fastened the retention bracket (and stopped swearing), you must temporarily remove the fan and screw the heatsink to the retention bracket.

The Socket AM2+ installation procedure is a lot more straightforward, as the Freezer Xtreme simply screws into the standard AMD retention bracket on the motherboard. However, you have to strike a delicate balance between using enough force to screw the Freezer Xtreme down without using enough force to break your mobo.

The Freezer Xtreme proved above average in our LGA775 test rig – its delta T of 51°C is an improvement of 5°C over the Intel HSF. However, within a minute of putting the overvolted Phenom II in our Socket AM2+ under load the CPU overheated and started to throttle. This is a terrible result and is simply inexcusable. Given the amazing history of the Freezer brand, the Freezer Xtreme is a terrible disappointment.

Overall
Simply not up to its significantly better forebears.

AM2	LGA775	LGA1366
29%	66%	🚫

Cooler Master V8

Great cooling for LGA775 CPUs, but there are better HSFs for LGA1366 and Socket AM2+.

atomic APPROVED
LGA775

Street Price $79
Manufacturer www.coolermaster.com

The V8 is one of several HSFs in this Labs test to be compatible with Socket AM2+, LGA775 and LGA1366 motherboards. Its 120mm cooling fan is located inside four large arrays of heatsinks, which are connected to the contact plate by heatpipes.

The V8 is mounted using a backplate and a rather daunting array of screws and other fixings. You'll have to remove the motherboard from the case to fit the V8, but the result is a very secure mount indeed,

which is just as well as it weighs 865g. Included is a fan controller that mounts in an expansion slot and adjusts the 120mm fan's speed from 800 and 1,800 rpm.

Strangely, we measured little difference in CPU temperature between the highest and lowest fan speeds. Our LGA775 test system showed a delta T difference of just 2°C, although the fan was noisy at full speed. Cooling was above average on all three CPU types, especially on LGA775 where it managed a delta T of 43°C.

This is easily one of the best coolers in the market, and a striking design that will look great in windowed cases.

Overall
Looks good and cools well – a must for any windowed, OCed machine.

AM2	LGA775	LGA1366
79%	84%	84%

Gigabyte G-Power II Pro

Blingy chrome, but it's not a particularly effective cooler.

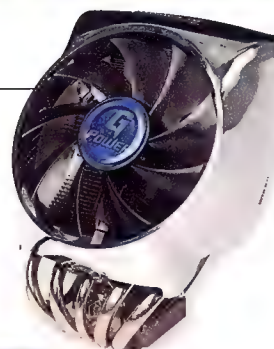**Street Price** $79
Manufacturer www.giga-byte.com

The G-Power II Pro's unusual shape and large dimensions mean it won't fit inside a lot of cases, although the position of the fan means it will blow air over the motherboard, providing extra cooling for the VRMs round the CPU socket. It's also shiny as all heck.

Mounting the G-Power II Pro on an LGA775 motherboard is a difficult and laborious process. First you have to screw two metal arms to the underside of the heatsink; these in turn are bolted through the motherboard into a backplate on the underside of the PCB – something that's hard

to do without three hands. Once installed, the HSF proved unable to cope with the heat output of our overclocked and overvolted CPU, with a peak delta T of 61°C. Although the CPU didn't get so hot that it started throttling, this delta T is 5°C hotter than the reference Intel HSF.

Mounting the HSF on Socket AM2+ motherboards is much more straightforward, as it simply clips to the standard mounting bracket that's fitted to all AMD motherboards. At full load we measured the G-Power II Pro's delta T as 61°C, one of the better results, although the fan is pretty loud.

As other HSFs provide similar or better cooling at a lower noise level, it's worth looking elsewhere for a Socket AM2+ cooler.

Overall
Not a great cooler, and not the most silent. Only fans of shiny things need apply.

AM2	LGA775	LGA1366
61%	47%	🚫

Noctua NH-C12P

Exceptional performance on Socket AM2+ and provides good airflow to the motherboard.

atomic APPROVED
Socket AM2+

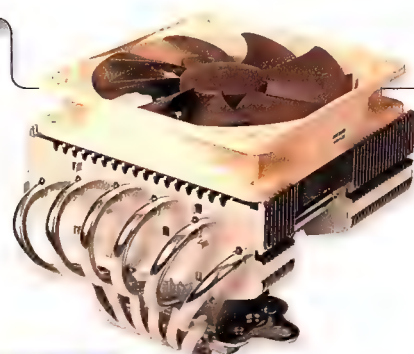**Street Price** $95
Manufacturer www.noctua.at

As the NH-C12P blows air downwards, your motherboard's VRMs will end up cooler, which could potentially extend their life and improve overclocking. The HSF is compatible with Socket AM2+ and LGA775 motherboards and comes with two resistor cables that you can insert between the fan and the motherboard, reducing the speed of the fan. It also includes some NT-H1 TIM.

The mounting mechanism uses a backplate, which secures to two plates that mount on the upper surface of the motherboard. Two further plates attach to the heatsink itself, which are then screwed to the plates on the motherboard, providing a very firm grip. This is in stark contrast to the flimsy arrangements we saw from many of the Socket AM2+ coolers.

The NH-C12P performed superbly in the Socket AM2+ test system, with a delta T of just 37°C under load – the third best result in our tests. It fared less well on LGA775, with its delta T of 54°C pitching it in the lower half of the results. As with the Cooler Master V8, the CPU temperature rose only a few degrees when we slowed down the fan.

Great for AMD fans (ha!), but not so much for Intel followers.

Overall
Solid cooling and thermal paste included. Win.

AM2	LGA775	LGA1366
86%	81%	⊘

Noctua NH-U12P SE1366

An excellent and very quiet Core i7 HSF.

Street Price $105
Manufacturer www.noctua.at

Unlike the NH-U12P, the NH-U12P SE1366 comes with two 120mm fans, which are designed to work in a push-pull arrangement on either side of the heatsink. The fans spin at 1,300rpm, but can be slowed to 1,100 or 900rpm by a set of resistor cables. The fans are very quiet at full speed, but running them at full speed seems a bit pointless as the CPU temperature didn't increase when we slowed down the fans.

Mounting the NH-U12P SE1366 on an LGA1366 CPU is relatively easy. First you screw two U-shaped plates to the underside of the heatsink, and then screw these through the motherboard into a backplate on the underside of the PCB. You then attach the fans on either side of the heatsink with a set of wire clips. Noctua's NY-H1 TIM is very easy to apply evenly (and spreads well on toast).

The NH-U12P SE1366 proved to be an excellent HSF, with a delta T of just 51°C regardless of the fan speed. This means our overclocked and overvolted Core i7 ran a full 20°C cooler than with the reference Intel HSF installed. While this is an excellent result, several other HSFs provided even better cooling, so unless you're obsessed with noise its worth checking out the competition before you buy.

Overall
Good cooling, and quiet, but not as cool as some...

AM2	LGA775	LGA1366
⊘	⊘	81%

OCZ Vendetta 2

Good for AMD CPUs, but not so good for Intel CPUs.

Street Price $69
Manufacturer www.ocztechnology.com

The Vendetta 2 has six large copper heatpipes, which snake their way up from the contact plate to a medium-size nest of aluminium fins above. These are cooled by a relatively quiet PWM-controlled 120mm fan that attaches to the heatsink with four rubber pins.

As long as you don't secure the fan first, the Vendetta 2 is one of the easiest HSFs to mount on a Socket AM2+ or LGA1366 motherboard – it simply clicks into place like some kind of clicking thing. However, you should also be aware that OCZ doesn't supply the LGA1366 clips as standard – the greedy outfit sells them separately for an outrageous sum. Although the HSF uses the industry standard push-pin retention mechanism for LGA775 motherboards, the pins are so stiff that it's hard to secure them in place without starting a feud with your motherboard.

The Vendetta 2 proved one of the best coolers for Socket AM2+ , recording a delta T of just 37°C – 9°C cooler than the reference AMD HSF. It was also pretty good in our LGA1366 test rig, as its delta T levelled off at 55°C, 17°C cooler than the reference Intel HSF. The Vendetta 2 was above average in our LGA775 test rig with a delta T of 49°C. Ultimately, the Vendetta 2 is a jack of all trades, but a master of none – and, ultimately, not much of a duellist, either.

Overall
Performs well, but not well enough to recommend above other coolers.

AM2	LGA775	LGA1366
79%	73%	78%

Scythe Mugen 2

Quiet running combined with all-round great cooling.

atomic APPROVED
Socket AM2+ & LGA1366

Street Price $99
Manufacturer www.scythe-eu.com

The Scythe Mugen 2 has five huge U-shaped 8mm heatpipes arranged so that each has its own individual heatsink. The contact plate is made of nickel-plated copper and houses the base of the heatpipes, although these don't make direct contact with the CPU heatspreader. Its 120mm fan is rated at up to 1,200rpm, making it the second slowest PWM-controlled fan on test. The box includes mounting kits for Socket AM2+, LGA775 and LGA1366 motherboards (take that, OCZ!).

Mounting is straightforward, if a little tedious, and involves screwing plates to the contact plate under the heatsink and then securing a backplate to that. As long as you follow the instruction manual you shouldn't run into any problems. You have to remove the motherboard from the case to fit the Mugen 2.

Cooling was excellent and the Mugen 2 was extremely quiet on each test system. It recorded the second lowest delta T on Socket AM2+ processors of 36°C and the third lowest on LGA1366 of 46°C – light years ahead of the reference HSFs. It wasn't quite as impressive on LGA775 CPUs though – the Cooler Master V8 and Titan TTC-NK85TZ recorded delta T's several degrees lower.

Overall
No matter you flavour of CPU poison, this HSF is one you'll like.

AM2	LGA775	LGA1366
84%	80%	83%

Scythe Orochi

The largest heatsink ever made, but size isn't everything (giggle).

Street Price $109
Manufacturer www.scythe-eu.com

It's hard to describe just how ginormously huge the Orochi is, so instead we'll list its dimensions – it's 120mm wide, 192mm tall and 155mm deep. It uses so much aluminium that it weighs 1.15kg – more than double the maximum weight recommended by Intel and AMD.

However, while size does matter in heatsink design to some extent, the shape of the heatsink is also critical. For example, the Orochi's heatpipes are so long that they hardly transfer any heat, which means that half the heatsink has very little role to play in cooling the CPU. The huge dimensions also make the Orochi a nightmare to fit, assuming your case and motherboard are big enough for it in the first place. What's more, the single fixed-speed 140mm fan struggles along at a pathetic 500rpm.

Unsurprisingly, the Orochi proved no better than the reference AMD HSF as its delta T was 46°C. It proved even worse in our LGA775 test rig, with a delta T of 64°C - 8°C hotter than the reference Intel HSF.

Scythe has taken the phrase 'size matters' to an extreme with the Orochi and the end result is an HSF that performs poorly, has a terrible mounting mechanism and is too big to fit inside many cases.

It's a waste of copper and aluminium.

Overall
Too big, too hot, and too dumb.

AM2	LGA775	LGA1366
48%	43%	🚫

Thermalright Ultra 120 eXtreme 1366 RT

A decent choice for Core i7.

Street Price $109
Manufacturer www.thermalright.com

Thermalright sells the same basic Ultra 120 eXtreme heatsink for other CPUs, but the 1366 RT version is compatible only with LGA1366 processors. Unlike the other versions, the 1366 RT model also includes a fan. This 120mm fan is PWM controlled and can spin at up to 1,600rpm. Most of the time it doesn't need to spin so fast.

Thanks to its large dimensions the Ultra 120 eXtreme 1366 RT must be screwed through the motherboard into a backplate on the underside. This is annoying if you've already built your PC, but it ensures solid contact.

atomic APPROVED
LGA1366

Once mounted, the Ultra 120 eXtreme 1366 RT proved one of the most effective HSFs on test, as the delta T between the ambient and CPU temperature was a mere 45°C. This was only narrowly beaten by the Titan TTC-NK85TZ running in full-speed mode.

The Ultra 120 eXtreme 1366 RT remains one of the best HSFs for an LGA1366 CPU, providing plenty of headroom for overclocking. However, with so many LGA1366 HSFs appearing on the market, it's worth shopping around before you decide what to buy.

The TRUE has been around for a while, and it's still pulling its not inconsiderable weight.

Overall
Still keeping on, keeping on. We <3 the TRUE.

AM2	LGA775	LGA1366
🚫	🚫	85%

Thermaltake V1

A V8 engine would probably be a better CPU cooler than the Thermaltake V1.

Street Price $89
Manufacturer www.thermaltake.com

Although the Thermaltake V1 is also very visually distinctive, it's actually a very poorly designed product. It has two nests of copper fins that are separated by a frameless 120mm blue LED fan. Thermaltake claims on its website that the fan draws in cool air from the rear and pushes it between the fins in front. In reality, as air likes to move through the path of least resistance, the fan merely blows air out of the sides of the heatsink. For all the good it does, the fan might as well not be there at all. It also lacks a frame, so keep fingers and stray cables well clear of the spinning blades.

The V1 is supplied with mounts for all three types of desktop CPU, but its awkward shape and size make it a pain to mount. Due to the pointless fan the V1 was unable to keep any of our CPUs cool enough to stop them overheating. The CPU took just ten minutes to throttle in our Socket AM2+ test rig, nine minutes in the LGA775 system and two minutes in our LGA1366 system.

Although the Thermaltake V1 is one of the most visually distinctive HSFs on the market, its terrible design means it would be better melted down and recycled into something useful.

EPIC FAIL
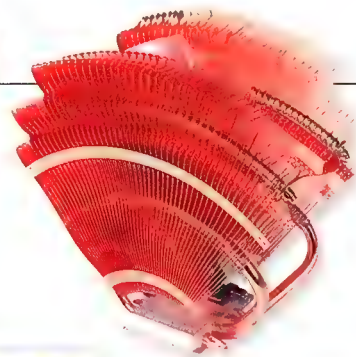
Overall
A poor design leads to poor performance.

AM2	LGA775	LGA1366
26%	26%	26%

GEEK SPEAK

Delta T A mathematical expression of the difference between ambient air temperature and the temperature of the hardware being monitored. For example, if the ambient air temperature outside a case is 25°C and the CPU core temperature is 75°C, the delta T would be 50°C. As ambient temperature is rarely constant for long periods, Delta T is a more comparable measurement than absolute temperature.

Heatpipe A metal tube (usually copper or aluminium) containing liquid that evaporates when heated, moving up the heatpipe to condense at the colder far end, when it flows back to the heat source again. This action transfers heat along the heatpipe and is effective even under relatively low heat loads.

PWM Pulse Width Modulation. An automated control function for fans, which can be identified by its additional fourth pin (not to be confused with Molex connectors). PWM turns the fan's voltage supply on and off in cycles to control the speed rather than using a variable resistor.

TIM Thermal Interface Material. Paste that's spread thinly over a CPU's integrated heatspreader (IHS) to ensure good thermal contact between it and the heatsink's contact plate. It also fills microscopic holes in either surface, ensuring maximum contact. Most CPU coolers are sold with generic OEM TIM, but higher grade TIM, such as Arctic Silver 5, is available.

Nothing to do with Tim the Wizard, sadly.

How fast is a hard drive?

Daniel Rutter asks the hard questions.

There are two basic hard-drive specifications - latency, and transfer rate.

Latency is how long it takes for the drive to start accepting or delivering data. Transfer rate is how fast the data then moves. Both are obviously the bedrock statistics on which all disk-subsystem performance is built.

But you shouldn't worry about either of them.

Computer enthusiasts love benchmarks. They're like putting your car on a dynamometer, or whipping it around an autocross track – except computer benchmarks are often free, and don't require you to budge from your comfy chair.

But you can spend a lot of time benchmarking hard drives, and end up with no actual useful information at all.

Sustained transfer rate is particularly irrelevant. If you're copying big files from drive to drive then

People who think they're original nerd gangstas, yo, like to use Iometer. But that's meant to test drives for multi-user servers, which the gangstas are probably not building. (See also, teenagers who pirate server versions of Windows which they do not need.)

There are several Windows drive-speed testers that're easy to run, yet give better-than-random results. HD Tach used to be a decent choice, but it doesn't work right on RAID arrays, I'm not sure if it behaves itself entirely properly in Vista yet, and it won't do write tests unless you register it. You might prefer HD Tune (**hdtune. com**), which has more features, even in the free version.

My current choice when I find myself unable to talk my way out of doing drive benchmarks is h2benchw (**tinyurl.com/4TNFZ**), from the

you don't get that 'HDD Test Suite' in the free version of PCMark.

The idea of benchmarks is to let you compare the performance of different hardware. Simple transfer-rate and seek-speed numbers, if they're made by non-broken software, actually usually are pretty good for that.

But they still don't mean much. The drive with a 40 per cent higher sustained transfer rate probably won't be noticeably faster under normal use.

And if you're just using a drive, not reviewing it, then... just use it. There are only three speeds a drive, or a whole computer, can actually have, after all: Blinding fast, tolerably fast, or too slow.

I wonder if I can get people to pay for a benchmark that tells them which of those three categories their drive is in?

Dan Rutter is waiting for your fetch command.
dan@atomicmpc.com.au

I think the only current publicly-available benchmark package that has somewhat reliable application tests is Mad Onion's PCMark.

raw drive speed can make a difference, but even then you're likely to find that multiple drives on the one bus give you much less than the single-drive theoretical maximum performance.

For other tasks – starting Windows, switching from one big app to another, doing stuff while a BitTorrent client sucks down data in the background – raw speed is almost completely irrelevant. The interaction of the moving parts and firmware, the motherboard data buses, OS disk management and whatever software you're running adds so many variables to the calculation that drive speed gets lost in the noise.

It's also possible to fail at the start, by picking the wrong benchmark.

SiSoft Sandra, for instance, has drive speed tests that're pretty much useless. (They may yet find an application as a robust source of random numbers.)

German computer magazine Computertechnik (or "c't"). It's a command-line utility, and the main documentation is in German. So it must be good.

H2benchw can do a wide variety of tests – but because there's no good way to write benchmarks on drives that contain data to cope with that data, h2benchw can only do write tests if a drive isn't even partitioned.

H2benchw has 'application' tests, which aim to mimic things like swap-file use, Photoshop and virus scanning – you know, the sorts of things that you actually do with a drive when you're not benchmarking it. But the readme, with refreshing honesty, says the app tests are outdated and unreliable.

I think the only current publicly-available benchmark package that has somewhat reliable application tests is Mad Onion's PCMark. But

KITLOG

There's nothing sexier than new kit. And whether you need to hoard your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and a collection of sports cars (Extreme), we're here to help with this handy matrix of Atomic recommended products. You may find your needs fall between categories – that's okay, just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in Atomic, so if you want to learn more, look up the issue and page number listed.

BUDGET

CPU
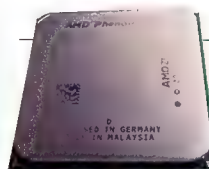
AMD Phenom X4 9550
PRICE $200

A well performing Quad core for those on a budget, that won't break the bank and doesn't get too hot.
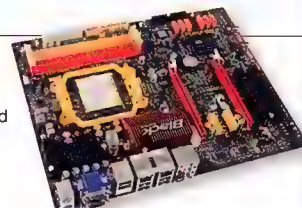
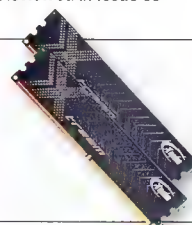**MOTHERBOARD**

ECS A790GXM-A
PRICE $200

Nothing says cool like a black mobo, and this one will satisfy your overclocking needs too.
Reviewed in Issue 99

MEMORY

TEAM Xtreem Dark PC2-6400 C4
PRICE $60

These modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.
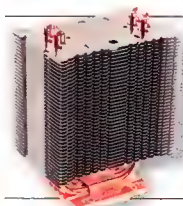*Reviewed in Issue 80 – Page 56*

VIDEO CARD

XFX 4770 NEW!
PRICE $155

The first 40nm desktop card, that not only overclocks amazingly but is also incredibly cheap.

Reviewed in Issue 102 – Page 41

COOLER

Noctua NH-U9B
PRICE $72

Labs tested to be the top of the cooling game without breaking the bank (or making you sweat – haha)
Reviewed in Issue 89 – Page 36

SYSTEM DRIVE

640GB HDD
PRICE $110

The absolute best value for money, with two 320GB platters giving great speed and low latency.
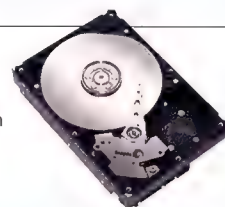
DISPLAY

AOC 2216Vw
PRICE $240

A great 22" widescreen for any purpose, with accurate colour reproduction and a bloody good price.
Reviewed in Issue 94 – Page 42

SPEAKERS

Plantronics Gamecom 777 NEW!
PRICE $94

This set of headphones is built like a brick, sounds like a harp and doesn't cost a bomb.
Reviewed in Issue 101 - Page 41

CASE

Cooler Master CM690
PRICE $100

A sturdy, spacious case with plenty of airflow and more than enough room for the biggest of systems. Some stores even have a windowed version!
Reviewed in Issue 84 – Page 51

PERFORMANCE

Intel Core 2 Duo E8400
PRICE $270

A processing powerhouse, now affordable and overclockable like buggery.

GIGABYTE EP45-DS4P
PRICE $200

A P45-based mobo with a bevy of features and a good overclocking potential.
Reviewed in Issue 93 – Page 55

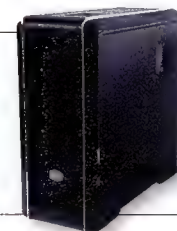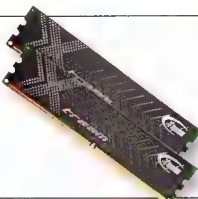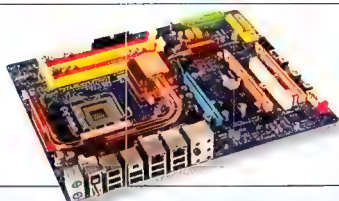### TEAM Xtreem Dark PC2-6400 C4
PRICE $60

Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.
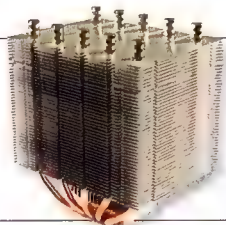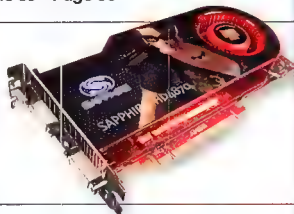*Reviewed in Issue 80 – Page 56*

Sapphire HD4870
PRICE $350

One of the best price to performance cards on the market. Welcome back Red!
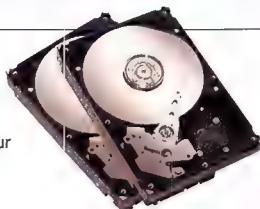*Reviewed in Issue 92 – Page 36*

Scythe Mugen 2
PRICE $84

The Mugen 2 performs almost as well as the TRUE, but has a fan included and is even a little cheaper!
Reviewed in Issue 100 – Page 42

640GB HDD - Times two!
PRICE $110x2

All the speed of dense platters, with the peace of mind to be able to back up your precious files.

LG W2252TQ
PRICE $270

You'll pay a little more for this 22" screen, but the colours are amazing, with no backlight bleed and no ghosting.
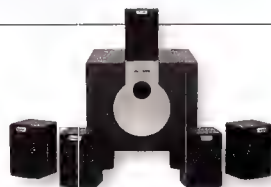*Reviewed in Issue 94*

AVLabs AVL325
PRICE $210

Slightly aged speakers now, but these still offer a great 5.1 sound experience - if you can find a set.
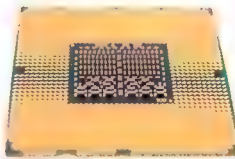*Reviewed in Issue 64 – Page 50*

Cooler Master HAF 932
PRICE $230

A massive case with three 230mm fans that can move enough air to qualify as a small aeroplane. And quiet to boot.
Reviewed in Issue 93 – Page 48

EXTREME

Intel Core i7 975 NEW!
PRICE: $1695

Intel's latest and greatest chip, complete with an unlocked multi, 45nm process, and a massive pricetag. Good for what ails you.
Reviewed in Issue 102 – Page 36

GIGABYTE EX58-EXTREME
PRICE $520

GIGABYTE has had the best overclocking board thus far, and therefore the perfect mobo for a beastly rig.
Reviewed in Issue 96 – Page 38
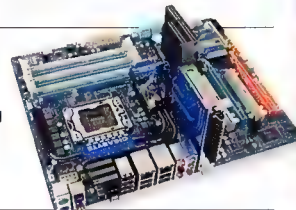
Corsair Dominator TR3X6G1600C8D
PRICE $515

Nothing says memory bandwidth like a triple channel kit of speedy, yet imposing RAM - a whole 6GB of it!
Reviewed in Issue 96 – Page 41

NVIDIA GTX295x2
PRICE $830 x2

NVIDIA catapulted themselves back to the top with this dual-GPU sandwich. Grab two of them in SLI for four-way madness!
Reviewed in Issue 98 - page 41
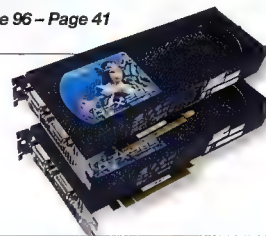
Thermalright Ultra 120 Extreme
PRICE $85

The current best air cooling - just make sure you grab a LGA1366 mounting kit to use it!
Reviewed in Issue 89 – Page 33

Intel 80GB SSD
PRICE $760

Blindingly fast, effortlessly quick, and uttely silent. Grab a normal HDD for storage, but games and OS need to live here.
Reviewed in Issue 94 – Page 50

Dell 3008 WFP
PRICE $2299

It's enough to make a grown man weep and beg. Or, at least, that's what we'd do for one of these simply gorgeous displays.
Reviewed in Issue 88 – Page 59

Logitech Z-5500D
PRICE $419

Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike.
Reviewed in Issue 48 – Page 56
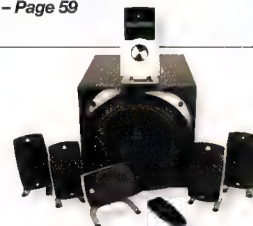
Lian Li X-2000
PRICE $740

The only case we've had in that has made the editor orgasmically happy, and is drenched with quality in every one of it's brushed aluminium panels. Definitely a case to show off your system-building prowess!
Reviewed in Issue 91 – Page 54

TUTORIAL

Time to get your grind on this month!

If you've ever played an MMO, you know the Grind. It's the slow, sometimes laborious process of levelling up your character and its skills. Well, be bored no more, as we unlock the secrets of how to push through the process, and maybe even have some fun on the way.

On a more practical note (though, for some, grinding is *ultra-practical*), we've got a neat little tute on how to make a handy backup and recovery USB stick. These things are cheap as chips these days, and very useful – once you've made yours, keep it on a keyring in case of dire emergencies!

Finally, we look at technology and education, and how if you've got a passion for tech and teaching, you could be passing on vital skills to the next generation of geeks.

Isn't it time to give a little back?

72

Monglor (5)

78

81
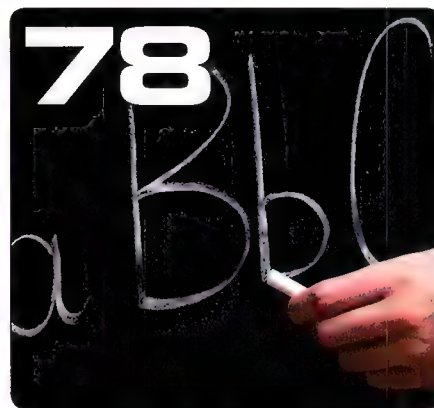
HOW TO BEAT...
THE GRIND

There is a place between fun and work. A place where fast reflexes and difficult challenges are for other people. That place is the Grind. We sent **Phil Hartup** there, armed with only a thermos of black coffee +1. He survived.

The grind has become a key component of many games. Its form varies from game to game, but it's most common in MMO games, such as World of Warcraft. The grind is an obstacle that you must overcome to level up your character and reach the endgame, where you can enjoy the best missions, see the best sights and fight the best fights. In EVE Online and Pirates of the Burning Sea, the grind is the means by which you keep yourself suitably equipped to fight other players. It's how you pay your dues.

The grind arose from MMORPGs, and once it had emerged it was inevitable that it would move into other genres. As a result, it's not uncommon to see games that reward not only those who play well, but those who play for a long time. Battlefield 2 was an example of an FPS that incorporated ranking and awarded points on ranked servers to allow players to unlock extra weapons. This was followed by Call of Duty 4 and Rainbow Six Vegas 2. In Saints Row 2, you have to perform mundane tasks in order to earn 'Respect', which then unlocks new missions.

The characteristics that mark grind-play are always the same: first, it lacks challenge and, second, it demands time. As a general rule, the grind is something that can be easily accomplished. It may involve dispatching feeble enemies time and time again, or fighting enemies in circumstances where your victory is meaningless. It may

The best way to take the sting out of any grind is to do it as a team.

Pirates of the Burning Sea may boast one of the shortest levelling paths of any recent game, but you still need to earn them doubloons if you want to get into the PvP.

involve carrying out a series of crafting actions, or perhaps just watching while your character goes from one place to another. In extreme cases the grind can be as elementary as making sure your character is within reach of other characters in the group so it can receive benefits while they do all the work. The time the grind takes is inversely proportional to its difficulty. It might be easy, but it will take you all day. Whatever simple action you have to do, you have to do it a lot. You have to put in the hours.

First Steps

There's no denying that grind-based gameplay is one of the more common characteristics of modern gaming, especially in MMOs. Adding an extended period of grinding to a game allows developers to extend its playing time without having to add more content. Take the typical template for an MMO quest, for example.

First, you meet the Quest Giver. Then you kill the monsters he wants you to kill, gain the items they were carrying and return with the items to receive your reward. It sounds simple enough and can be done very quickly. The problem is that if the player accomplishes it very quickly, they will need another quest right away. How can the developers stretch this out? The classic technique is to reduce the drop rate of the quest item, so if you need to collect 20 items from one type of monster, and that monster only drops the item half the time when you kill it, suddenly you have to kill 40 monsters and the entire process takes twice as long.

This may sound cynical – and in some ways it is – but there are other reasons why developers might want to add a grind element to a game. For a start, not only does it increase the value of a game in terms of gameplay, but if a game is fun, even as a grind, it gives players more to sink their teeth into. After all, if combat is enjoyable, killing 40 monsters instead of 20 won't be a chore.

What's more, grinding encourages two of the better elements of the MMO experience: the sense of accomplishment you feel when your character reaches a certain level, and the social aspect of these games. If you're playing a frantic action game where a second of lost

concentration results in you being clubbed like a piñata, conversation will be, at best, limited to pleas for help to stop the bad men clubbing you. Counter-Strike isn't renowned for its witty repartee, whereas a game based on relaxed, long-term gameplay allows plenty of time for the idle chatter for which chat windows were made.

For players who are looking to get to the raids in Warcraft, the serious mass PvP of Warhammer Online or a deadly warship in EVE Online, the grind is the price they must pay in hours. For many players, simply writing off hours of their lives to almost mindless drone work is a bridge too far. Fortunately, our handy list of hints will help you drag yourself through the pain.

Guide To The Grind

1 Get Your Mind Right

Before you embark on a serious session of grinding in any game, you should give it some thought beforehand and make sure you're up to the task. If you want to catch up with high-level friends in World of Warcraft and you're taking a run at getting to level 60 or beyond completely unaided, you should be aware that you're taking on a game that can cheerfully eat 40 hours just to clear the newbie areas. Unless you can honestly say you are willing and able to commit, you're just wasting your time and money. It's a good idea to look for a trial account or demo before you commit to give yourself an idea of whether you'll actually be able to endure the game for the required length of time.

2 Preparation, preparation, preparation.

To plough through a grind as quickly and painlessly as possible, you need to work out beforehand how best to achieve your aim. For example, it will take a lot longer to plough through Warcraft if you play a healer class such as a Cleric than if you play a damage-dealing class such as a Warlock. You also need to plan your route, your character's development and, in some games, even acquire some addons to make your life easier.

Questhelper, a World of Warcraft addon that's available for free from **wow.curse.com**, is a must-have if you're grinding quests, because it shows you where all your quest targets are on your map. You could argue that if the developers wanted you to know where all your objectives were, they would have marked them on the map themselves as Warhammer's developers did. Ultimately, though, Questhelper could save you days of levelling, so it's up to you.

As well as third-party programs, the Internet is crammed with levelling guides, such as those found at **www.wow-pro.com**. These will help you select the least time consuming and most rewarding quests, and tell you how to do them.

3 Out to lunch

Once you have planned your route and worked out a development path for your character, you need to make sure you're set up for the task yourself. If you're planning to blast through the grind in extended sessions, you'll need to have the appropriate provisions. Eschew the use of really potent energy drinks such as V and Red Bull when indulging in this sort of gameplay, because you really don't want to be *that* awake. Regular Coke, tea or coffee should be enough to keep you conscious during an extended gaming session without making you bounce off the walls. Grind gameplay isn't the sort of edge-of-the-seat action where you need your wits about you and your reflexes sharp; as long as you're not actually asleep, you should be able to handle the typical day-to-day monster killing of any MMO. Snacking during play is all very well, but remember that unless your computer is

The grind has filtered across the genres, even to GTA 4. If you want to unlock all the costume options for multiplayer then you'd better get to work. A few hundred runs of the Hangman's NOOSE co-op mission is the quickest way.
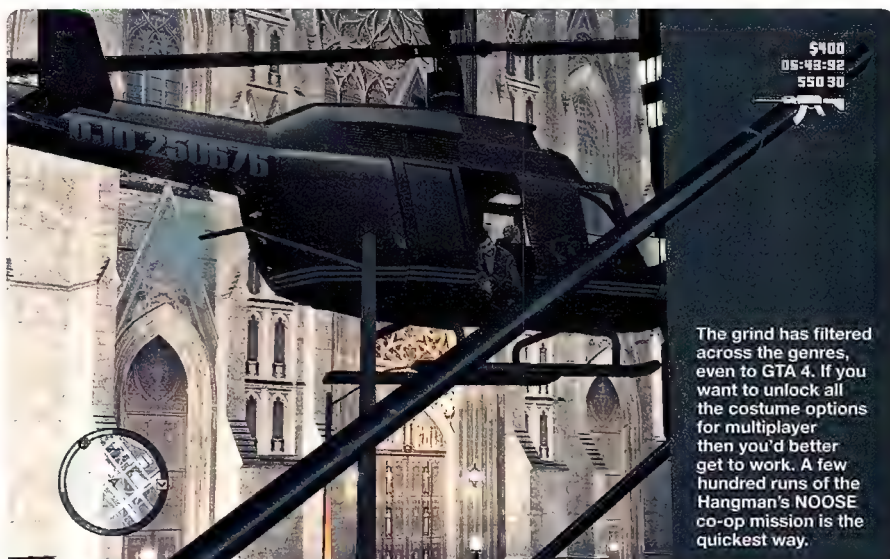
Although EVE character skill levels don't even require you to be logged in to make gains you still have to earn an honest crust, either by killing folks and taking their money, or by mining asteroids. Mining asteroids is less fun than it sounds.

Crush your enemies, see them driven before you, here the lamentations of der women. Then do it again. And again. And again. And again...

Remember that, when all is said and done, you're playing a game.

powered by a foot pump, you're burning as close to zero calories as makes no difference, so watch what you're scoffing (yes, you are actually now reading dieting advice in Atomic. No, the world hasn't ended).

4 A Little Help From My Friends

Going into any sort of laborious grind in a game is a chore, but when done with friends it can be a lot of fun. If possible, try to join a group of other people along the way. Start out with friends from other games, nose around the game as you play or look on forums. Making your way through an MMO world will always be a grim experience if you don't try to engage with the others around you. Although picking up

or joining groups of random players along your journey can sometimes slow you down or divert you from your planned route, it's precisely this kind of unpredictability for which you're paying your subscription.

5 Enjoy it

If you're not enjoying the grind, then stop. Remember that, when all is said and done, you're playing a game. If you start to feel as if the time you're spending in a game is like time spent at work without the cheque at the end, then don't let anybody tell you to stay with it. A serious gaming habit will eat your free time as ravenously as any career, relationship or education and, barring some sort of fluke, it won't give you anything in return, so be careful if you're getting in too deep.

If you really can't stomach any more grind, there is an alternative. You can buy pre-levelled characters for most games on Ebay. While this is technically cheating, and doing it makes you a forlorn soul doomed to rot forever in gaming hell, it's an option of last resort if you can't find the time or the energy to kill the million or so assorted mobs that stand between a

new character and the level cap. You won't gain the same understanding of the game and characters that a person who has played all the way through has, and you're depriving yourself of most of the content the developers have slaved over, but you'll have saved yourself a few days' work too. If your conscience or your wallet won't allow you to take such drastic action, just remember that while you're at your screen pouring your precious free time into making pixels dance, you're doing it because you enjoy it and you're having a good time.

Quickly recover Windows

Restore a clean installation of Windows just by inserting a USB thumb drive with **Josh Blodwell.**

Most of us have damaged an OS so badly that it's required a reinstall at some point, whether you've been tinkering around or just plain unlucky. Sometimes System Restore can get you out of trouble, but this isn't always an option if you lobbed a metaphorical spanner into the works with a particularly forceful throw. You therefore need a way to create a backup of your system in your preferred state that's ready to go at the press of a button. All you need to achieve this is a USB thumb drive, a copy of Partition Saving (**www.partition-saving.com**), a safe environment in which to run it and a Windows XP installation CD.

UBCD4

Unfortunately, you can't open Partition Saving in Windows, as the OS restricts access to many of the files needed. However, there are several methods you can use to run the app. You could create a DOS disk, load the Vista Recovery console or make a Windows PE (preinstalled environment) disk and add the Partition Saving plug-in to the installation.

We're going to use the latter method, as it's

You can easily customise UBCD4 with premade plug-in files such as savepart.cab for Partition Saving.
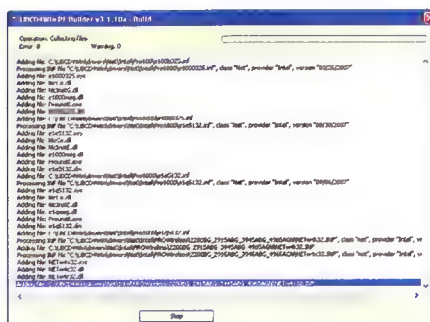
UBCD4 combines elements from your XP install CD to make the PE environment.

easier to perform from a standard Windows installation. Start by going to **www.ubcd4win. com**, navigate to the Downloads section, grab the latest version of UBCD (Ultimate Boot CD) and run it to create the UBCD4 disk builder.

UBCD4, and other PE creators, require the use of the Windows XP cabinet files, so you'll need a Windows XP installation CD (a Vista install disc won't work for this), preferably with Service Pack 2. Open the CD in Windows Explorer and copy all of its files to a folder on your PC. You'll also need a copy of the Partition Saving PE plug-in, which can be downloaded at **www.partition-saving.com/savepart.cab**

Run UBCD4 and point the Source field to the folder into which you copied your XP installation CD, and then click the Plug-ins button. Click on the Add button, select the savepart.cab file and then click OK. After that, scroll down the Plug-in list, make sure that the Partition Saving entry is enabled and then click Close.

You can now either export the boot disc as an ISO file, or write it to a CD using the bundled writing software. Choose your preferred method, select a destination for your ISO or CD,

and then click Build to start the process. Using the writing software is simpler, but you'll have to create the CD again if something goes wrong. We recommend creating an ISO image, and then burning it to CD using a separate application, such as Nero Burning Rom.

Partitioning

If you're using Windows Vista then creating a new partition is simple, as the tools are included in the OS. Open the Start menu, right click on Computer and select Manage. In the Computer Management window, select Disk Management under Storage from the left-hand pane, and a list of physical drives will appear. Now right click on your C drive and select properties to determine how much space is being used – t in our case, this is 9.8GB.

Right click on the drive again, select Shrink Volume and make your drive larger than the filled space on the drive – ours was close to 10GB, so we chose 11GB to be safe, but you can leave more space. Then right click on the unallocated section of the drive, and select New Simple Volume. Follow the Wizard to cre-
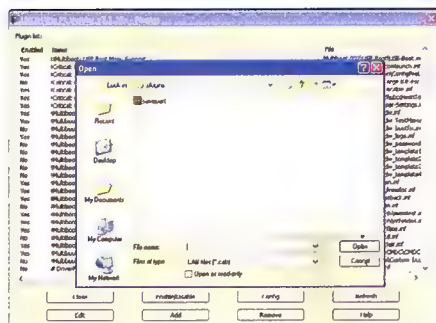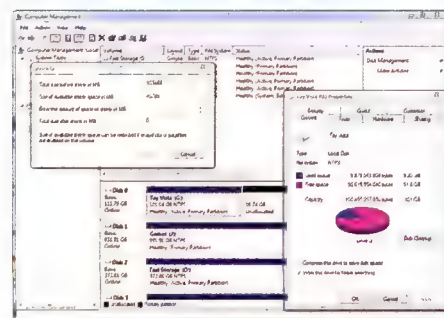
Vista's partition resizing tools make light work of creating a restore partition.

ate another 11GB drive and make sure that you set the File System to FAT32 when you format it; this simplifies matters when you create your backup. When you've created your partitions, give them memorable names such as 'Windows' and 'Recovery' as this will help when you sort though the drives in Partition Saving.

If you're using Windows XP, you can download a free application to manage your drives instead. We used Partition logic, which can be downloaded from **www.partitionlogic.org. uk/download**. Grab the latest CD-ROM image and burn it to a disc using Nero, Roxio or the image burning app of your choice, then boot from the CD and resize your drives in the way described above.

Preparation

Your next job is to prepare your OS. Ideally, you want to create a snapshot of a freshly installed OS, as it's smaller and will take less time to save and restore, not to mention giving you peace of mind. Before you start, load Windows and perform a proper shutdown, which will ensure that Windows is in a healthy state.

You can now boot your PC with the Ultimate Boot CD – but get a coffee after initiating the process, as the CD takes a very long time to boot. When the CD finishes booting, you'll see an environment that looks very much like

Make sure that you know which partition is on which physical hard disk.

Windows: this is the Windows PE. Of course, it isn't a full-blown installation of XP; it's a super-safe mode of the OS that allows you to perform a variety of system tasks without Windows protections getting in the way.

Your first task here is to use the PE to defrag the drive containing the OS. Click on Start > Disk Tools > Defrag> Defraggler Disk Defrag. After that, select your drive from within Defraggler and start the Defrag process. This will consolidate all the data on the drive without leaving any stray junk lying around, but don't worry if there are a few bits and pieces that aren't consolidated. If you see a large chunk of remaining data afterwards, it's probably your page file. If you're backing up a Windows XP system, you can remove this by opening the drive in My Computer and deleting the Pagefile.sys file. You can then try to defrag again.
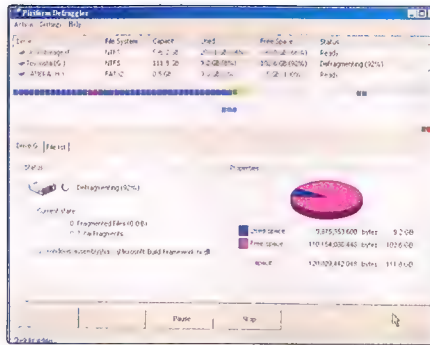

It's important to defrag the drive from UBCD4, as it has access to files that would otherwise be restricted.

Saving

You're now ready to make your backups. Start by opening up Computer Management from Start Menu > Control Panel > Computer Management. After that, navigate to Disk Management under Storage as before, and note which drive number contains your Windows partition – it's usually Drive 0, but don't simply assume that this is the case.

You can now run Partition Saving from Start Menu > Programs > Partition Saving. Select Save an element In the Partition Saving window, and then select the drive number that contains your partition. You'll now see a full list of the partitions on the drive, including the MBR and Partition Table. Select the drive you wish to back up, and you'll be asked what you want to save from this partition. The best option is to select occupied sectors without swap files. This will return the smallest footprint, although it involves a lengthy search. If you've already removed the swap file, or want to back it up anyway, choose occupied sectors.

Now choose your destination files by press-
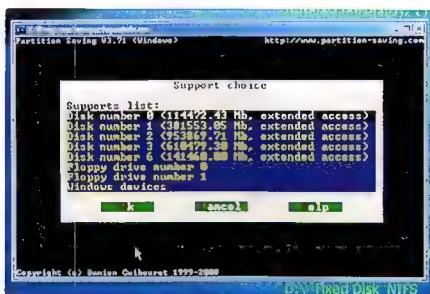
If you noted which partitions were on which physical drives, this screen won't be confusing.
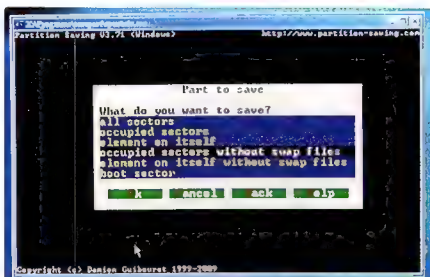
Choose occupied sectors, or the backup could be huge.

ing Ctrl-Tab to move the cursor to the Options field, and then select Automatic naming by pressing Space. After that, press Ctrl-Tab until the cursor is in the Drives field and select the recovery partition. Then press Tab until the cursor is in the File field and enter the name for your recovery file – we called ours IMAGE.PAR – and hit Enter.

You'll now be asked for your preferred maximum file size – just hit Enter and continue. The 'Deflating' screen will appear and ask which compression ratio you wish to use. We used the suggested value of 2, as levels 5 and above take a long time for diminishing returns, so don't bother with them. You can then hit Enter and wait for the copying process to complete – our 10GB drive copied in around ten minutes.

When it's finished copying, press Enter and you'll see the option to make an automatic restore file. Select Yes, press Enter and then give your file a name in the next window. You can now hit Enter twice to finish and the application will close.

Restore your OS

To roll back the OS to the saved image, you just need to boot into UBCD4 again, open the Partition Saving application and restore manually by selecting Restore an Element, pointing to the first backup and selecting the drive to which you wish to restore your old OS. However, there's a more direct and convenient route: using a small USB flash drive to start the process.

You'll first need to create a bootable USB key using the HP Drive Key Boot Utility (**http://ti-nyurl.com/2stbot**). When your flash drive is bootable, copy the savepart DOS executable onto the key, as well as the configuration file created by Partition Saving, which you'll find on your recovery partition. In the root directory of the flash drive, there should be a file named autoexec.bat – if not, create it using Notepad. Open the file in Notepad and add the following line:

```
savepart -r -f <configuration
filename>
```

Then save the file.

Keep the key clearly labelled in a safe place, so that you can dig it out and set your motherboard's BIOS to boot from your USB thumb drive if you want to automatically recover your OS. Now you can tinker to your heart's content, safe that you'll always be able to recover from practically anything. Your pr0n is safe.
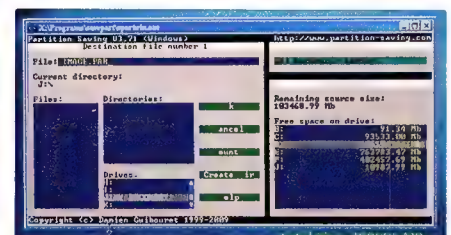
The Save File screen can be a pain to navigate, but Ctrl-Tab allows you to navigate between menus.

IT Education

Chris Taylor wants you to get into the classroom and teach a whole new generation of tech geeks.

The five year olds I came to know during my first semester as a student teacher were more adept at Google than the average adult. The topic of the term was life cycles in nature. Sit the kids down in front of a computer and they'd know what search terms to use to get the pictures and information they desired. They might spell 'caterpillar' and 'butterfly' in some very interesting ways, but on the computing front they were switched on.

The modern classroom is exactly what a geek would wish he or she had when they were a kid. At the primary school I was initially placed in, every classroom had an interactive whiteboard. For every two classrooms there was an adjoining lab with at least ten computers. Gone are the days of having a couple of Macs in the room which are only to be used for playing *Where In The World Is Carmen Sandiago?* and typing up assignments in *Word*. No longer is information technology something distinct, something completely separate from literacy, numeracy, science, arts and the humanities. Technology has

been worked into every area of the curriculum, giving computer literate teachers the opportunity to make their lessons that much more powerful and engaging.

Sadly, the computer illiterate has yet to become an extinct or even remotely endangered species in education. There might be lots of great products available and many schools are buying them, but usually there are only a couple of teachers in a school who really know their stuff. Even among the younger teachers, who would have gained their teaching qualifications in recent years, there's a real shortage of folks with 'computer sense'. In my own course, the Master of Teaching (Primary), we have to do a unit on using information technology in the classroom. Each week we're shown a variety of

programs, ranging from the exciting to mundane. We've been introduced to brilliant sites such as NASA Bright Lights and newspaper archives with records dating back more than a century, but we've also pissed away hours doing awfully mundane things like using *PowerPoint* to make animated short films. There's so much enthusiasm for bringing information technology into the classroom, but there simply aren't enough of the truly savvy to get the most from the very expensive products schools are investing in (those interactive whiteboards set a school back about eight grand apiece) or to stamp out some of the more impractical ideas. Technology can do amazing things in a classroom, but if someone doesn't know what they're doing and is prone to overexcitement, there's the risk of having

Sadly, the computer illiterate has yet to become an extinct or even remotely endangered species in education.
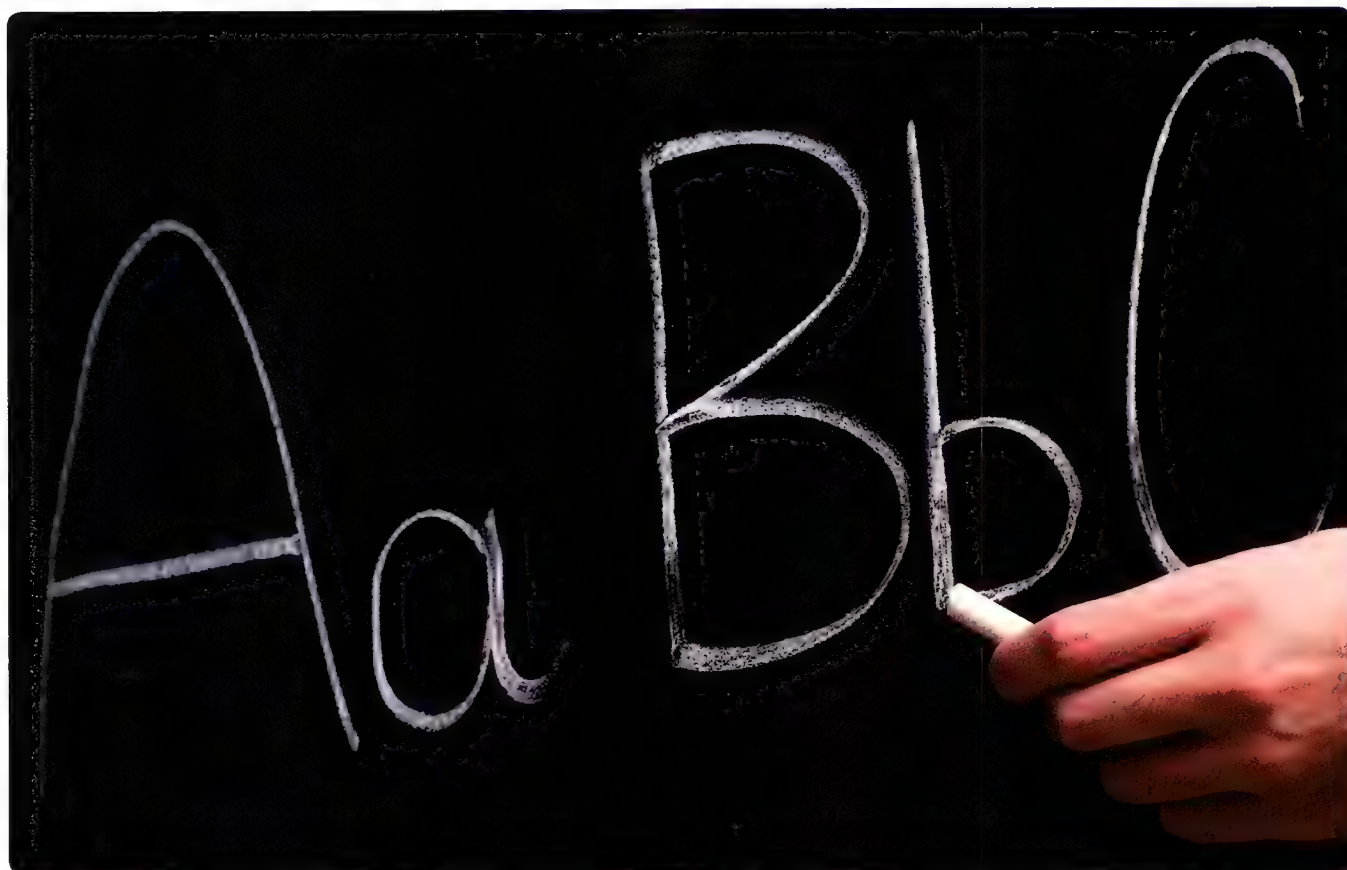
technology for technology's own sake.

This is where, I feel, you come in. The starting salary for teachers is good. The entry requirements for degrees, whether undergraduate or postgraduate, are reasonable. Kids are a hell of a lot of fun to work with. Selectors for graduate diplomas and Masters-level teaching qualifications tend to look favourably upon those with proven backgrounds in information technology, as they know just how important computer skills are to the modern school. Employers look favourably upon it too, as do the children themselves. My prep students loved that, within a few seconds of one of them asking the teacher a difficult question, the teacher could bring up Firefox on the interactive whiteboard and find the answer. A teacher who really knows how to best use technology can do a lot of good – not just by using the interactive whiteboard, education software and the internet to assist in giving interesting and meaningful lessons, but in teaching the next generation how to use technology properly.

When I was in school, using the Internet for research was strongly discouraged. Most teachers wouldn't accept it. Nowadays, some teachers take the opposite approach. The internet, rather than the library, is the first port of call. Whereas once the school library was the source of truth, the internet now is. Children simply aren't taught to be cynical of the internet. If the teacher themselves is a bit too caught up

by how exciting a given website or application is to be cynical about it, their students aren't going to judge it critically either. A computer savvy teacher could teach children to be more wary about what they find online. Children need to understand that something isn't true because one site claims it is. They should be inclined to find multiple sources that make the same claim, to find credible sources, to be always on the lookout for the many forms of bullshit that clog the web. Just like you do when you're online. If you're reading this magazine, presumably you've been around computers and the internet long enough to judge critically everything in an environment where every user has the opportunity to be a producer. A healthy level of scepticism towards technology isn't something that's taught in university courses. What's taught is an ugly unbridled enthusiasm. As such, blind passion rather than cynicism is what's modelled in classrooms. In short, geeks make for very good teachers – at least when considering matters pertaining to technology in the classroom.

Where to get your smarts

Graduate-entry teaching courses in primary and/or secondary education, aimed at those with a non-education background, are offered by the University of Adelaide, Australian Catholic University, the University of Ballarat, Bond University, the University of Canberra, Charles

Sturt University (which also offers a graduate-entry diploma in information technology education), Curtin University of Technology, Deakin University, Edith Cowan University, Flinders University, Griffith University, James Cook University, La Trobe University, the University of Melbourne, Monash University, the University of New England, the University of New South Wales, the University of Newcastle, Queensland University of Technology, Royal Melbourne Institute of Technology University, the University of South Australia, Southern Cross University, the University of Southern Queensland, the University of the Sunshine Coast, the University of Sydney, the University of Tasmania, the University of Technology Sydney, the University of Western Sydney and the University of Wollongong.

To enter one of these courses, you will need a Bachelor's level degree in a field other than education and a half-respectable academic record. Depending on your state and chosen institute, you may also have to fill out a special form explaining why you want to be a teacher and any relevant experience you have. Those looking to enter postgraduate secondary education

Bachelor of Education is a better qualification than a Graduate Diploma, which is the most common graduate-entry teaching qualification, so do consider this option if you're yet to enter university or are still at a point in your Bachelor's where you can easily move between faculties.

So long as you're the right sort, teaching is very rewarding. The teachers and students of

A number of universities offer double degrees that combine a Bachelor of Education with a Bachelor of Information Technology.

courses will probably need to nominate, based on their past studies, specialisations – that is, subjects they will teach once they are employed. To be qualified to teach a specialisation, you need to have done at least two relevant second year units. If you're doing an information technology Bachelor's of any description, this means you'll be able to enter a postgraduate secondary course with a view to becoming a secondary-level information technology teacher. In Victoria, you need two specialisations, so if you're only just starting your Bachelor's it's probably a good idea to plan ahead. Perhaps you can use free electives to do a minor in mathematics, science or English. Postgraduate primary teaching courses don't require you to select specialisations.

There are, of course, options at a Bachelor's level. A number of universities offer double degrees that combine a Bachelor of Education with a Bachelor of Information Technology. The

the 21st century have so many resources right at their fingertips and it's a shame to see how many teachers are incapable of getting the most out of them. Though you may rarely, if ever, teach information technology directly unless you're a specialised information technology teacher, as a teacher you will make frequent use of technology in your job. To be in a position where you can channel children's innate interest and adeptness with technology in a positive direction, in a direction that helps them learn, think critically and communicate effectively, is really something. Not everyone is suited to teaching. Not everyone with a love of technology and a love for sharing their love of technology is suited to teaching. But for those who have that natural ability to relate to kids, teaching is a worthy option to consider when looking for a job that will let you exercise and share your passion for technology.

Dear Geekette

Truly geeky advice for the dateless and lovelorn.

Unlike regular columnists, who present a single answer, Geekette presents several, because troubleshooting always requires several steps before you go to tech support level two; am I right?

Dear Geekette,
How do you tell your geek-girl that you fixed her computer because it was frustrating her, you knew how to do it, and you thought that it would be a nice surprise, as opposed to being an insult to her feminist independance?

Dear Worrywart,
I think you answered your own question, there. Perhaps if you make sure you leave a browser session open to **www.feministing. com** or **www.feministgamers.com**, she'll be reassured that you considered her feminist independence before wading in. Another option is to bake cookies, do the laundry or clean the bathroom: that way you can underscore your commitment to equality in the relationship by saying "I finished the ironing. Oh, and I fixed your computer too." This is tragically obvious, though, unless you usually do the laundry and bathroom. Your final option is to pretend to do it for your own benefit, which has the added ring of authenticity – "I've been really cranky that we haven't been able to frag together, had a few spare minutes, so I fixed your computer, sorry."

Dear Geekette,
How do you cope with dating someone who has cooler T-shirts than you who won't share them. (you'll stretch them out in all the wrong places!)

Dear Teeshirt Thief,
There are two, possibly three options here. The first, and by far the simplest, is to dress only in black. That way, you'll always be cool, or at least relatively stain-free (assuming you don't bake. Flour and black do not play well together). The second is to out-teeshirt them. I'd suggest thinkgeek (**www.thinkgeek.com**), Glarkware (**www.glarkware.com**) and Threadless (**www. threadless.com**) as starting points. The final option is to steal their shirts and stretch them out

so that they will, forever after, be yours.
Also, my teeshirts are totally off-limits. I'm just saying.

Dear Geekette,
Standard question from someone who, in his professional life, hunts down and kills spammers and puts in place mechanisms to block unsolicited approaches: How do I make an approach to someone if I'm not sure that they'll be receptive to such an approach?

I've been really cranky that we haven't been able to frag together, so I fixed your computer...

Dear Sysadmin,
Under the privacy regulations you can make a single approach, but if they opt out, that's your shot gone – unless you persuade them that you have an ongoing relationship, which, let's face it, is what you're aiming for. Obviously, you'd rather they not opt out at the first approach, so you'll need to calculate their level of interest.

It's often quite difficult to calculate interest. For starters, you have to figure out if it's simple interest or compound interest. I'd assume simple interest, but if you can get your interest calculated daily, you're better off in a long term relationship.
I jest.

After close observation, I have deduced that receptiveness to an approach can be indicated in thirty different ways, some of which are orthogonal to each other. I've coded a small script which allows me to input the five key variables and 25 secondary variables to calculate the receptiveness rating. I'll happily upload it to yousendit.

The five key variables to rating receptiveness are attentiveness, laughing at your jokes, asking you questions, saying approving and/or admiring comments and offering you things (coffee, foodstuffs, a jacket if you're cold, etc). You'll need to fill in my patented checksheet at a minimum of five 5-minute face-to-face meetings, input the data into my application, and the results will automatically calculate a ratio of receptiveness.

Receptiveness ratios of 0.79 and above have been shown, through long experience, to equate to FWB (friends with benefits), while 0.85 and above is more suggestive of a fling. If you can rate above 0.92, there's a good chance of long term relationship, with potential commitment.

For truly effective results, you'll also need to input a voice recording, which obtained from the person in question. Podcasts and Youtube are by far the simplest method here, but you could also try calling him/her.

Alternatively, while you're trying to get that voice recording, you could always ask him/her out for coffee and/or non-caffeinated beverage of choice. It's less scientific, but at least it's quick.
ps: Everyone worries about this one.

Zara Baxter is guaranteed to be correct at least 50 per cent of the time. On average.
zbaxter@pcauthority.com.au

IF A FRIEND TELLS YOU LIFE SUCKS
TELL THEM WHERE TO GO

reachout.com.au

Log on if life could be better

GAMEPLAY

There's no more classic piece of PC gaming history than Wolfenstein, so we spoke to developer Raven about supernatural Nazis, alternate worlds, crazy-big guns and how kick-arse this game is shaping up to be.

We've got a sneak peak at Red Dead

Redemption, spent some time jumping about mines and rope-puzzles with Damnation, spitting electricity from our fingertips with inFamous, and playing through the Wolverine movie tie in. Oh, and we killed some robots alongside John Connor. Get to reading!

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Wolfenstein

Raven's new Wolfenstein delivers occult Nazi butt-kicking action like never before. **Seamus Byrne** looks behind The Veil.

What is Wolfenstein? As the original face of a genre that launched a thousand ships to follow, there is a widely held understanding of what this franchise stands for. Nazis. Crazy experiments. Occult dealings. More Nazis.

Taking a glance at new screenshots from the latest update to the Wolfenstein series, you could easily get the feeling Raven is taking the franchise deeper into the occult experimentation realm, with a lot of undead looking faces and glowing greens in dark tunnels. And we know how much glowing green light screams evil occult experimentation, right?

For the purists, there's no need to fear. Peter Sokal, Community Manager at id software assured us that Wolfenstein was not becoming more about scares around corners than shooter action.

"Wolfenstein has always been about fast-paced combat mixed with the dark occult and supernatural, so while there is often something nasty around the next corner, players will have

Do I get to kill Hitler?

We know that everybody loves the chance to kill a virtual Hitler, so let's get it out of the way right here. No, he doesn't make an appearance this time around. id tells us you can shoot up paintings of the Fuhrer all you like, but for this story it doesn't make sense for him to pop up in the game. Next time, Adolf, next time…

the proper firepower to blow it to hell."

"A great example of this is a level called 'Hospital' where players first meet the Assassin. He's a real nasty bastard that can sneak up on you, cut you down, and even taunt you. Unfortunately for him, this is also the same level where players are given the Tesla Cannon! Seeing the lightning shock, cook and fry the Assassin and his buddies is a really rewarding experience for the player."

Talk of Telsa Cannons certainly gets us giggling with glee, and it seems there's many more new toys thanks to a fresh team throwing some big new ideas around and seeing what fits.

"One of the great things about the Wolfenstein universe is that it isn't grounded in history or realism," says Sokal. "So the key to the process was to focus on the pillars of the franchise: occult, supernatural Nazi experimentation and fluid, fast paced first person combat. With every idea we came up with, we would look at these key factors and ask ourselves how we could make it the right fit for the franchise."

"Players can expect to wield some very unique and satisfying toys this time around, such as the Tesla Cannon I mentioned, as well as the Particle Cannon. The Tesla Cannon is absolutely devastating in terms of area-of-effect damage and the Particle Cannon, which uses a concentrated stream of Veil energy, disintegrates enemies on contact. When your enemies hear that gun power up, they freak out!"

"Another tool that players will be able to use creatively is the Veil Barrel. We've got your standard red, explosive barrels in Wolfenstein

but we also have these barrels that contain veil energy. The player can restore his veil energy from these, or he can pick them up and throw them at enemies. When the barrel explodes it will essentially remove gravity from the proximity and cause objects and enemies to float uncontrollably. So, if you're pinned by some enemies using cover, chuck a veil barrel

at them and have a good laugh."

Maybe we need to take a step back a second. Veil? What's all this Veil talk? Well it's one of these big new ideas that adds a whole new layer, literally a parallel dimension, to the Wolfenstein universe. Sokal fills us in on where this all fits into the game's story.

"In Wolfenstein, the Nazis have come across an energy source known as the Black Sun, which they plan to tap into so they can strengthen their army and win the war. The problem is that to get to the Black Sun, they need to enter a dimension known as the Veil, which rests on top of our reality and serves as a bridge from the real-world to the Black Sun."

We've heard about some of its influence on weapons and environment, but Sokal also points out some other ways it impacts on gameplay — say hello to some new powers our intrepid hero can wield!

"In the game, BJ Blazkowicz — our hero — comes across an amulet that gives him access to the Veil and its powers, which have all been designed to enhance the combat experience," says Sokal. "The player will have access to four Veil powers throughout the course of the campaign, which include Sight, Mire, Shield and Empower. On a base level

...we really just set out to build on the strengths of the franchise and notch it up a level.

these powers have utility in combat, and when upgraded can create some significant changes in the experience."

Sight will let you see through walls and structures, and Empower lets you shoot through them too. Put these two bad boys together and you'll be getting kills that would otherwise have opponents screaming 'hax!' Mire lets you show down time, or even freeze enemies in time once it's fully upgraded.

Raven and id are staying Mum on multiplayer details at time of writing, but they did say that

fans of the RTCW MP will not be disappointed. They also confirmed the Veil and all those delicious powers will also be featured. So if you are a disgusting cheat you'll now be able to hide your 'sploits by saying "No way! I was just using my Veil powers!"

Raven's new flavours

Raven has clearly brought a lot to the table that is sure to offer a unique Wolfenstein experience. With their FPS experience on titles like Quake 4, they were clearly up to the basic task, but

Raven Creative Director, Eric Biessman, also points out that lessons and inspiration can come from many different places.

"From every project that you work on you take away lessons," says Biessman. "Some of them are hard lessons, when you learn an idea didn't resonate or work right. Some are awesome lessons where you see something work exactly the way you were hoping it would work."

"It is surprising to find how dramatically different game types — Marvel Ultimate Alliance vs. Quake 4, for example — can still yield great lessons that you can take to the next game. With that in mind, we really just set out to build on the strengths of the franchise and notch it up a level."

"With Wolfenstein, the guys started as fans of the universe and the previous games," says Biessman. "They all had favourite moments, characters, game play and weapons they knew they wanted to touch on in the game."

"Wolf is all about fast action and combat. We know we needed big weapons and evil enemies. We also needed to make sure that the strange occult and dark science that was so prevalent in the previous games came in strong. RTCW started with a mage sealing an evil knight into an eternal prison! We needed to make sure that carried on."
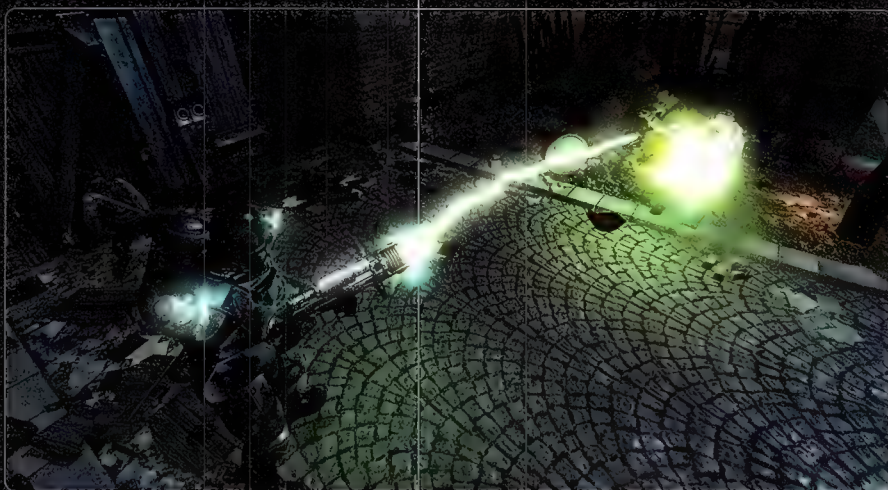
"That's how the Veil was born. We wanted to give the player the opportunity to really tap deeper into the occult side while still keeping that butt-kicking combat."

Under the hood

Kicking some tyres, the latest Wolfenstein is using a highly modified id Tech 4 engine.

board, so when Luetscher talks about objects breaking apart, he actually means that almost everything is dynamic and breakable. This can wreak havok (yep, I went there) with AI enemies, but Luetscher also tells us they've got it covered.

"Our AI has been enhanced to navigate this dynamic world and intelligently take cover in it. Plus the number of AI characters in a typical combat scene is usually three to four times more than what we used in Quake 4. In some scenes, there are swarms of AI characters that are over a hundred."

"We also added a streaming system that allows us to stream all kinds of game assets," says Leutscher, "including textures, geometry, animations and audio. This allows us to populate the Wolfenstein world with more detail and make the levels bigger, grander and more open."

When you've got a big, grand, open world, you'd better dress it up to look pretty epic. Kevin Long, Wolfenstein's Art Lead, tells us how they found blending real-life historic aspects of World War II with the sci-fi/fantasy spin.

"It wasn't overly difficult considering the real-life technological leaps made during WWII, the weird weapon designs from both the Allies and the Nazis, and the real-life occult practices and beliefs of the German Nazi Party and the SS."

"Raven was given free rein to create all sorts of outlandish weapons and creatures for Wolfenstein," says Long. "I believe they were very successful by keeping their designs within the timeline and technology of the 1940s. For example, the more outlandish looking weapons of Wolfenstein are all kind of 'out there' in their look and powers, but if you look at the overall design of those weapons, they look like they were created during the 1940s, using that era's manufacturing practices and technology."

So by what measure will Raven and id feel the new Wolfenstein has been a successful evolution of the franchise? Peter Sokal gets the final word.

"Our hope is that fans new and old will really enjoy this evolution. We hope the old-school guys immediately feel like they are playing a Wolfenstein game, and that new players get a truly fresh and unique experience that only Wolfenstein can deliver. If we accomplish that, then we will consider the game a success."

Dwight Luetscher, Technology Lead at Raven, filled us in on a lot of the juicy tech details. Like how they make those glowing greens so perfectly 'supernatural'.

"We wanted the highest quality lighting solution, so we rewrote the renderer to use deferred shading so we could handle hundreds of dynamic lights in any given view. We added soft shadows to the tech and have some of the best-looking shadows in the industry with no jaggies."

"We also had a number of new effects systems that do most of their work on the GPU, allowing us to put out thousands of particles per effect, instead of a few hundred. And there is a new post-process system that allows our artists to dramatically enhance the look of any scene."

"Seeing objects break apart and fly around as BJ is fighting with occult Nazi forces is really something," says Luetscher. "Especially with the Veil powers and supernatural weaponry spicing up the screen."

They've also now brought Havok Physics on

Red Dead Redemption [PREVIEW]

The open country of the spaghetti western has never looked so... open. Or fun.

We walked away from our time with the Call of Juarez sequel last month saddle sore and weary of shoe-horned and overly clever game mechanics masquerading as innovation. And still, we hold out hope for a good take on the western game, something that brings the frontier alive with either a mouse or a control pad as your trusty make-believe six-shooter.

Red Dead Redemption might just be that game.

Our time with it was limited to hand-held walkthrough of three portions of the game's many missions. And there are a lot of them – the game's essentially Grand Theft Auto with spurs on. In fact, the three areas that make up the game world (the Frontier, the Plains, and Mexico) are much bigger than GTA4's Liberty City.

Introducing John Marston

The player steps into the shoes of reformed criminal and outlaw John Marston, a man who turned his back on violence to find a new life for his family. But, in true dirt opera style, that life is

not done with him, and he's called upon by the Bureau of Investigations to return to the west.

Rockstar believe it's far better for the game's story to give you a named and fully fleshed out character to play in its games. It certainly worked for the plucky Nico in GTA, and the sour, somewhat bitter Marston looks to be another great Rockstar creation. Dialogue was not in place in our preview, but even his body language portrays a weary (and wary) outlook on the world.

Throughout the game Marston will get access to new clothing sets, and a range of new weapons, all of which will be represented about his body. In the missions we saw, he had what looked like a Colt revolver on his hip, a lever-action Winchester, a knife, and a lasso. All the weapons are based on real-world counterparts.

We're guessing – though we didn't get a chance to see it in action ourselves – that the lasso will feature heavily in a lot of physics-based gameplay. Just so long as it's not as stilted as Call of Juarez's take, we'll be happy.

Marston can take advantage of much the same targeting system you might be familiar with from GTA4, though there have been definite
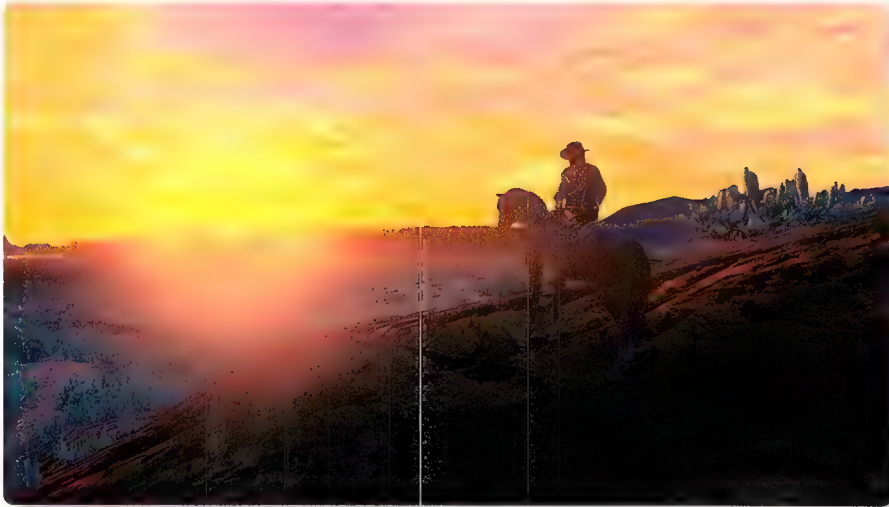
refinements to match the grittier and more realistic feel of the game. Also present is the Dead Eye mode from the first Red Dead game, where you can either slow down the world around you for detailed action, or stop play for a moment to pinpoint certain targets before blowing them away in a flurry of lead. Dead Eye is a power-up based on how many men you put in the ground – the more you kill in a fight, the more your Dead Eye meter increases, and the more likely you'll be able to drop into this cold killing mode.

The open range

RDD has a similar structure to GTA4 when it comes to missions, but there are slightly less of them, and spread out over a greater area. The missions we saw were all very flavoursome takes on some classic western tropes.

First up was a hostage swap – a desperado in your custody for a pretty lady friend being held by some ne'er-do-wells in the abandoned town of Tumbleweed. Of course, the handover doesn't work, guns are drawn, and you've got to fight your way through town to rescue the pretty lady.

The gun-play seems accurate and balanced, while still retaining a lot of western flavour. The pistol is great for short-ranged work, while you can aim over the iron-sights of the Winchester to pick off targets further away. In fact, we saw one poor bastard get clipped in the leg as he crossed the peak of a roof to fire down on us. He clasped his leg in pain, only to fall over and then roll off – still clasping the gunshot leg.

As we worked our way through town, we saw him limping off into the sunset.

This kind of environmental interaction is thanks to the game's implementation of NaturalMotion's Euphoria Physics engine and the Rockstar Advanced Game Engine (RAGE). We've seen this before in GTA, and in Midnight Club LA, but it really shines in RDD. The environment seems to be truly alive, and after we'd rescued our fair maiden we galloped off to see a bit of it.

The open world is full of bandits, posses and lawmen, all going about their business. You might come across man hanging from a tree, a broken down carriage or a herd of wild horses – each will have its own natural place in the landscape, and you'll have the ability to interact with all of it. In fact, if you'd stumbled across the hanging at an earlier point, you can even step in to save the poor guy.

Assuming you're playing nice. You can always just watch.

The critters are just as alive, from packs of wolves who might chase your horse if they're not too busy hunting prairie-dogs, to your horse itself. In fact, each horse will have individual stats when it comes speed, the ability to not freak out and throw you if you stumble across a rattlesnake, and general stamina. As you're galloping about the tracks and trails you can pick up the horse's speed by spurring it on, however this drains stamina and might even enrage the animal.

Even the wild horses we mentioned can be caught and broken in. And, we presume, sold for a handy profit in the various towns dotting the world.

All up, RDD is a much more exciting and dangerous place than Liberty City ever was. So many previews, especially recently, have left us feeling warned off rather than excited about a game, so it's a real pleasure to be feeling quietly excited about an upcoming release. The game will be out in the third quarter of this year on PS3 and Xbox 360. Whether a PC version is coming, it's hard to say – Rockstar is being cagey.

No matter, this is game that's looking like it will be worth playing as soon as you can. **DH**
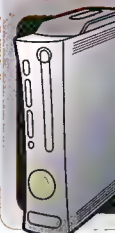
Xbox 360 and PS3

Developer **Rockstar San Diego**
Publisher **Rockstar Games**
Website **www.rockstargames.com/**

✓ Fluid mechanics; open world; detailed environmental interactions

✗ Some odd death animations – horses don't explode when you shoot them...

Anticipation rating
This is a game we're getting very excited about. Yee-ha!

92%

Damnation [PREVIEW]

It's early code, but it's going to take a miracle to save this game from the same fate as its name.

The free-running adventure game is becoming a bit of a trend. It started with Assassin's Creed (you know, we can never remember where that damn apostrophe goes!), continued with Mirror's Edge, and soon to drop games like Prototype, inFamous and Assassin's Creed 2. And, like all trends, there are the fashion winners, and the fashion victims.

Damnation... it's looking more of the latter than the former.

The game's set in an alternate Earth, after the American Civil War has been going for decades. It's a very steampunk feel, with lo-tech solutions delivering hi-tech outcomes, like steam powered assault rifles. And there's a rich industrialist type who wants to oust both North and South and set himself up as dictator.

Now, that seems like a winning formula right there (unless you hate steampunk and alternate history), but the coolness is buried under some laboured voice acting, stilted cut scenes, and – worst of all – a lame excuse for free-running action.

Damnation promises a vertical world unlike any we've seen before, with the ability to perform some serious Hollywood action movie moves. Unfortunately,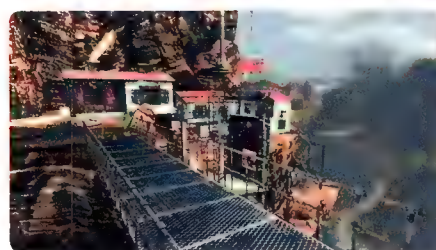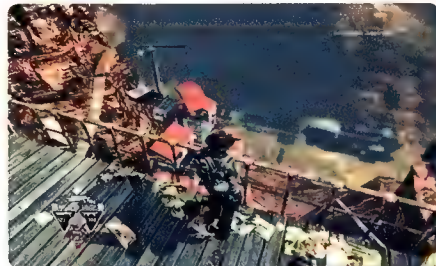 at least in the level we played, that verticality comes at the cost of the size of the levels. We progressed through a series of caves, leading our bickering, dull-witted and at times whiney buddies (devs, if you're going to force me to keep reviving stupid NPC pals every time they walk into a steam-flung railway spike, at least make them kind of likable), each cramped passage eventually opening onto another arbitrarily high (or deep) cavern scattered about with shacks and balconies and rope bridges.

In short, it's an OH&S nightmare. Can you believe people live like that? Of course, in this level they're all crazed miner zombies – or something – so perhaps each level has a different excuse as to why its denizens seem to think zipping about hundreds of meters above a killer drop on a rope is their idea of work safety.

There are above ground levels, but the verticality remains. The artificial nature of it all wouldn't be so bad if the mechanics of moving about the world weren't so lame. Say what you will about Assassin's Creed, but at least it gave the impression of fluid movement. inFamous does it even better. But your time in Damnation is split between working out the platformer-like puzzle aspects of the world, while badly performing a limited array of tricks that never quite delivers on that action promise.

And don't get me started on the woefully inaccurate weapons. Or the much touted AI that uses the environment just like you do ("Quick, we're being attacked! Everybody grab a rope and move to another precarious ledge so we can get snipe-BANG!").

We saw a lot of good looking trailers for this game and we were legitimately hyped to get some hands on play. But cool hats (you do wear a very cool hat in the game) and steampunk trimmings do not a good game make. It's one thing to show what is no doubt a developer (or a vat-grown five year old console ninja) making a game's moves look fluid and intriguing, but if the game can't actually deliver on that promise there's something wrong - as forum user clockworkman also discovered (**http://forums.atomicmpc.com.au/index.php?showtopic=15609**).

Damnation will be out by the time you read this (it's releasing May 26th), so it's hard to imagine that any major improvements can be coded in between 'now' and that date. It's a tough call to say this based on a limited preview, but this is a really tough game to recommend. **DH**

PC, Xbox 360 and PS3

Developer Point of View inc
Publisher Codemasters
Website http://damnation.blueomega.com
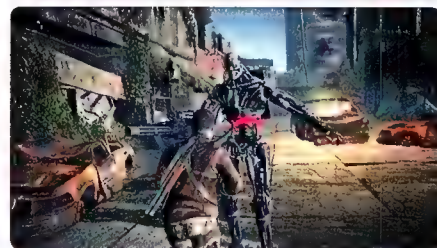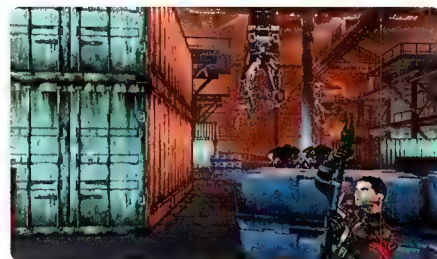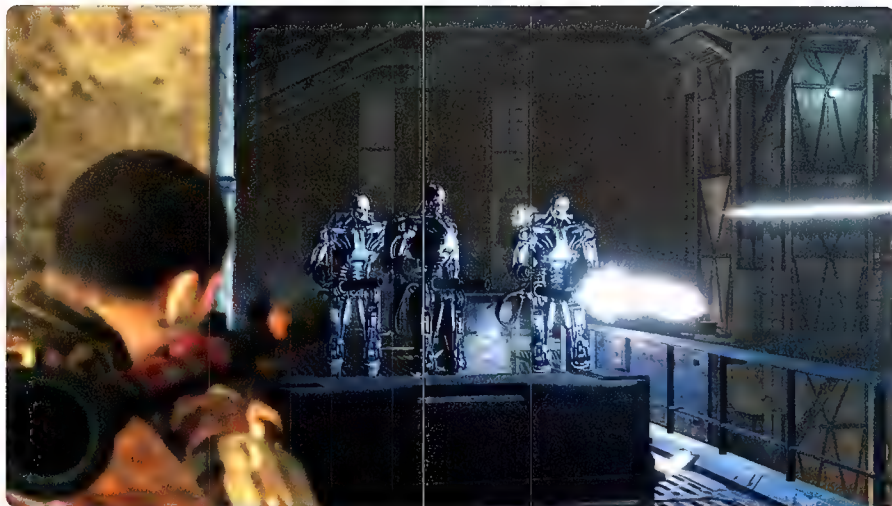
✓ Interesting setting; big hat.

✗ Poor voice acting; slow controls; silly level design.

Anticipation rating
Wake us when this comes out. Or not.

41%

Terminator: Salvation

Take on the evil Skynet and fight for... *yawn*

I've often thought that if I were a superhero, that games designed around cheap movie tie-ins would be my Kryptonite. In actual fact, I'm not a superhero, and my real Kryptonite is beer.

But I still don't like cheap movie tie-ins.

If you've not worked it out by now that's pretty much the easiest summation of the game Terminator: Salvation. We could easily leave the review at that and pad it out with some shiny pictures so at least you can get some enjoyment from the game. But that would be the easy way out, and rob us of the chance to rant.

The game is set before the events of the film of the same name, placing you in control of John Connor as he runs around battling the evil killer robots of evil killer robot overlord Skynet. It's third person, with all the modern flourishes you'd expect of a third person game: locking cover, visible weapon load-outs and a rudimentary (read: non-existant) squad system.

It's a truism that killing evil robots is a victimless crime (like killing Nazis, really), but in this game the crime is not so much what you are doing on screen, but the tricks the game pulls to make you think it's actually being clever. Here's an example.

In an early level you're tasked with using an RPG-7 to take down a Hunter-Killer (one of the big flying robots that fans of the first film would be familiar with) that's got you and your squad pinned in a building. As it strafes around the outside you've got to dodge in and out of cover, popping up to take your shots with your limited ammo. But... there's a pile of rockets on the floor of the building, apparently limitless, the HK is on predictable rails, and if you move to one of the rare spots where you can actually look out of the building and around the nearby environment (say, to nail the HK as it slides around from another side of the building) you'll be greeted with the alarming and rather old-school sight of the model popping in and out of the world.

No wonder most of the holes in the walls featured invisible rails to stop you peeking too far out.

On top of that the cover system is more annoying than useful. It's too sticky, for one thing, meaning that we at least preferred to stay the hell away from low walls and vehicles in case we randomly stuck to it and got shot at. For another, there's the blind fire feature; in some games this is a useful way of forcing opponents to duck so you can advance, but what's the point when you're fighting *unstoppable killer robots who do not flinch*. All it does is waste ammo for no good reason.

Oh wait, the reason is that blind-firing looks like a cool function on paper.

It's telling that Christian Bale refused to not only voice John Connor for the game, but that he also refused to have his likeness used. We like to imagine that the conversation went a little like his tirade against the Director of Photography that did the rounds a month or so ago, with liberal use of the word fuck.

It's certainly a word we used liberally while we were playing the game. **DH**

360, PS3, PC (reviewed on 360)

Developer GRIN
Publisher Warner Bros Interactive
Website www.terminatorsalvationthegame.com

Graphics
Blocky at best, and totally without atmosphere. **71**

Gameplay
Annoying cover system, boring gun battles. **44**

Sound
Alarmingly adequate. **72**

Overall
There is no salvation for this game, and we absolutely did stop playing it. **56%**

X-Men Origins:
Wolverine

Not even bugs, poor controls and annoying boss-fights can stop this mutant creation from being fun.

Movie tie-in games usually evoke a shudder of dread from gamers. When you see one coming, you know to expect kludgy controls, an after-thought of a storyline – assuming it's not just stolen whole-cloth from the film in question – and second rate voice-acting. This latest Wolverine game, intimately connected to the film of the same name, has all of those issues, and more, but somehow it still manages to keep us coming back for more.

It's kind of uncanny – the game's faults far outweigh what it gets right. To begin with, graphically, it's a mixed bag. Every other texture seems to be a low-res port from a game coded in 2001, meaning that interesting bits of architecture – like bloody, scalpel-pricked bodies in one of the lab levels – that should be really interesting are little more than multi-hued blobs of colour. There's also no way to really play with the game's settings – outside of choosing the resolution, you're stuck with no AA or anything else a serious gamer will usually head to take advantage of their kit. And yeah, we did play this on PC, and yes, we know it's a console port – we still think that's no excuse.

And speaking of PC, we rarely say this, but this is a game that most likely plays best on console. The controls are workable, but given that some special moves require esoteric key combos to activate, the game can easily devolve into random button mashing – which still seems to see you through most fights! There's a range of fancy combo-attacks and gruesome kills, mapped to combinations of right and left mouse buttons (which, we admit, actually works well),

but trickier moves tend to lead to tears of rage. Especially during boss fights.

It can be argued that the boss fight is the bane of the modern gamer; an archaic hold over from simpler, more arcade-like times. You know, the gaming equivalent of your appendix – largely useless and easy to ignore until it blows up. In Wolverine, it's much the same – they get in the way of a really good run of violence, seem to lack any real logic behind them, and ultimately come down to more good old button mashing. There's one particularly enraging fight early on that mirrors a fight in the film that Logan loses – of course, if you lose it too early in the game you get a Mission Fail and are forced to start again. In fact, it's not until you beat your opponent down to zero health for the third bloody time that a cut-scene kicks in to show you how badly you lose the fight anyway. Mutant rage!

At least there's no Quick Time components. That would be a game-breaker.

But through all of this, the game still manages to be entertaining!

It's not a deep game, by any means, but there's a certain God of War sense of mayhem in every fight. Your attacks are all directional, allowing you to upper-cut one guy into the air and then easily turn on his buddy and take the time to kill him properly while the first poor bastard recovers. There's a nice mix of area effect attacks, you can toss opponents around (and on to convenient spiky bits), and the level of violence is both horrific at times and immensely satisfying. Especially the ability to watch Logan get torn up – down to his shiny bones in some

instances – and then slowly regenerate. This is a very neat graphic effect that does a lot to bring you into Logan's mutant healing factor shoes.

And when we say 'torn up', we really mean it. There's an annoying lack of blood in the film, but this game answers the question of where it went. It was here, along with the ragdoll bodies, the dismemberments, and regular unveiling of Logan's spinal column. It's actually kinda neat.

So, at the end of the day you're left with an oddly compelling game that you'll keep playing despite its flaws. In fact, it's probably better than the film! **DH**

360, PS3, PC (reviewed on PC)

Developer Raven Software
Publisher Activision
Website www.uncaged.com

Graphics
Some good, some bad. Striking use of gaping wounds. **70**
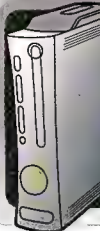
Gameplay
Can get repetitive, and lacks depth, but still engaging. **71**
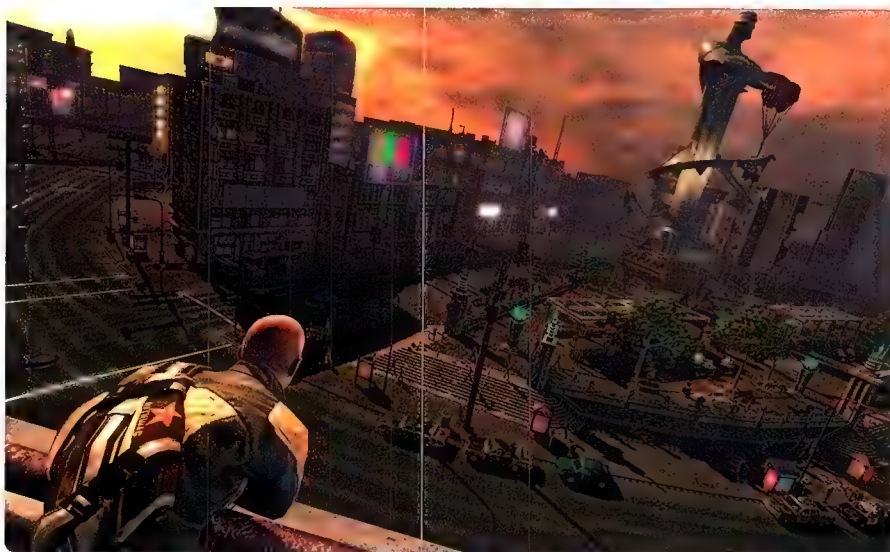
Sound
Easily the game's weak point. **68**

Overall
A lot of fun despite its flaws.

76%

Infamous

A courier gets an array of shocking super powers in this PS3 exclusive. Zzap!

Let's be honest up front – we're not big PlayStation3 fans here at Atomic. No one at HQ owns one, there are very few PS3 games that appeal (Wipeout being the notable exception), and generally we'd rather spend time on our beloved PC or begrudgingly hunker down with an Xbox if we must spend time at a console.

inFamous, the latest PS3 game is turning us around a bit though, thanks to its excellent mix of solid plot, open world gameplay and really quite intriguing powers.

But first, the issues. Our console setup (or one of them, anyway) is based around a full HD Sony Bravia. Pretty much everything looks good on it – except for inFamous, which is as jaggy as all hell. In fact, as I type this, my cheeks are hurting from having to squint to pick up some of the detail! When you combine this with the large open city you get to run around in, which has not been designed with the same subtle eye to detail of other large games (for instance, GTA's great use of colour and architecture to suggest an individual sense of place to each neighbourhood), it's very easy to feel kind of lost. Or at least out of place.

But then again, you'll very rarely be standing still, and as the game and your incipient powers progress, you'll be moving about very fast indeed.

The game starts off with you, the lone survivor of a cataclysmic blast. In fact, you're at ground zero, and it's quickly revealed that you were carrying the device that's devastated a good portion of the city! More importantly, it's also left you – and a good many other residents – changed.

The opening missions are all about learning your new powers, from the ability to jump off tall buildings without harm to being able to toss lightning at people you don't like – such as the homicidal gang types ruling the city since it went into lockdown following the explosion. These powers are unlocked reasonably regularly and there are some real doozies – sucking the life-force from fallen enemies is one, as is the ability to toss a sticky energy ball. Kind of like a plasma grenade from Halo, except you can conjure it pretty much out of nothing.

All of your powers, as you may have noticed, are electrical-based, and as you run out of juice you'll need to replenish it from nearby streetlights, cars or other powered items. The end result is that the good citizenry of the city are almost always running from you, either in abject terror of your ability to turn a gang of toughs and any innocent bystanders into twitching corpses or scared of the vast areas of the city you can leave dark.

inFamous also features a moral system, whereby you either slowly turn to evil or good – or perhaps fence-sit in between. It's a little like the KOTOR system, except while small things like healing the injured or draining wounded enemies to heal you might sway you to good or evil in small steps, the larger moral choices are almost two-state minigames: the game will stop, warn you of the moral choice, and then let you button-press your way to enlightenment or self-interest. It's a little hard on the immersion level, but the resulting rock-throwing or happy faces from the city population is a nice effect.

But the best part of the game is the free-running action. Assassin's Creed is (like Damnation) the natural comparison, but this is free-running done well. Where AC simply asked you to keep a button pressed to enter into a free movement mode, but still required a degree of precision, inFamous uses the jump button as a contextual control to leap, grab, shimmy and so on; each iteration of your movement requires a key press, leaving you feeling much more in control. The game's also very good at working out what you're aiming for, so tight precision isn't necessary – you'll reach out and grab for what you were aiming for nine times out of ten, and if not? Well, you can handle the fall.

From the comic-like cutscenes to the thought put into the powers and how they interact, inFamous has a surprising amount of depth. And it's fun. And has an interesting story. Can you ask more from a game? Not really. **DH**

THINGS TO SEE

X-men Origins: Wolverine

Have the reshoots and edits made Wolverine a better film? We find out...

Distributor 20th Century Fox **Director** Gavin Hood
Starring Hugh Jackman, Liev Schreiber, Danny Huston

When a film is in trouble, there are telltale warning signs before it's even been released. There are last minute reshoots of key scenes, re-recording of dialogue, and editing of established sequences. You'll often see no or late viewings to critics, too, and in Wolverine's case, one can even argue that the early leak of a working cut was a brilliant piece of guerrilla marketing and research.

So, the question is... where does that leave the film on release?

Let's be honest up front - it's not nearly as good as X-Men 2. And, before you panic, it's not nearly as bad as X-Men 3 - thank the Gods! But that leaves it sitting in difficult territory alongside the first film in the series, a good enough exploration of characters that we know and love, but lacking in the heart and soul that made the second film such a great piece of storytelling.

However, you can also see the film that it could have been, and I get the feeling that the re-shoots and last minute work have actually saved the film, rather than presaged a clawed and savage disaster.

There's a lot of ground to cover in this film, and without giving too much away to neophytes or those wishing to avoid spoilers, we get to see Wolverine's life from a young age up to his recruitment by Colonel Stryker. And that's just the first ten minutes! It's a brash move, fitting in so much, and for some the brief glimpses of Civil War Wolverine or Wolverine storming the beaches on D-Day will be just that - all too brief!

But it serves its purpose, and echoes the line from the first X-Men film:

"He has uncharted regenerative capabilities, enabling him to heal rapidly. It also makes his age impossible to determine. He could very well be older than you, Professor."

It also, for the comic book fans, ties in to the characters established origin story. Wolverine has indeed been around for some time.

Following the credits the film travels at break neck pace from mutant to mutant, introducing the likes of Deadpool, Agent Zero, The Blob and more. It's at once exhilarating and annoying, as we never really get to know any of them, apart

from Dominic Monaghan's Bolt, who gets a bit more screen time and, consequently, a bit more pathos. It's also about then that we get intimations of the main plot of the film, as Stryker starts building the pieces for his Weapon program.

Gavin Hood directs with workmanlike skill, but it's in the quieter moments where you feel the lack of Bryan Singer's more humanist touch. There's no real central relationship for the film to hang off - Wolverine and Sabretooth don't have a bond, so much as they represent the two sides of controlling one's inner beast. Certainly, there's no set up to match the triangle between Cyclops, Jean Grey and Wolverine that

... without the pathos of Wolverine's quest to discover his past, the character lacks depth.

anchored X-Men 2 so solidly. It's that lack which is almost what hurts the film the most, but the real issue is simple.

We know how it ends.

It's the same issue that hampered the Star Wars prequels - we know Darth turns. In that instance, if we could have been made to care about Anakin, the movies would have made for grand Shakespearean tragedy. Similarly, we never quite get close enough to Wolverine to care that he's about to lose everything he knows. Hugh Jackman is still a superlative casting choice, but the overwhelming feeling is that without the pathos of Wolverine's quest to discover his past, the character lacks a certain depth.

Our final niggle is that the film is simply too bloodless. In aiming for a PG-13 rating the film loses a lot; whenever Wolverine stabs someone with his bared claws and they appear bloodless moments later, it's hard not to feel robbed.

Still, it's a romp of a film, with some great set piece action scenes, some brilliant makeup effects (trust me, The Blob is... ew!), and fine performances from Jackman, Danny Huston as Stryker (played so well by Brian Cox in the second film), and especially Liev Schrieber as Sabretooth, who's psychopathy and menace is a pleasure to watch. And I must admit a soft spot for Ryan Reynolds' Deadpool, who is wonderfully snarky.

Looking back over this review, I feel I'm sounding harsher than I'd like. The movie does suffer in comparison to other great Marvel efforts - and those comparisons are impossible to avoid - but it is an enjoyable film nonetheless. In many ways it's not Wolverine's origin story that matters, but rather the overall place the film has in the X-Men tapestry - we learn so much more about mutants and the plots against them: the clash that the first two films set up so well and that the third squandered forever.

So it's worth seeing, without doubt, but go in without too many expectations. At the very least, Wolverine puts the X-Men franchise back on track. Hopefully Magneto's origin story can bring back the human element that Wolverine lacks. **DH**

Overall
Not the best superhero film, but fun enough.

74%

DISC OF THE MONTH

Star Trek Original Motion Picture Collection (Blu-ray)

The classic films find new life in this epic box set.

It's a great time to be a Trekkie. Not only do we have a shiny new film out at the cinema (which we reviewed last issue), but there's great new merchandise coming out, the old series has been revamped with new effects, and now we get this excellent box set showing off the first six films of the series.

This set actually has seven discs: one for each film up to Star Trek 6: The Undiscovered Country, and a bonus disc with a special roundtable discussion called The Captain's Summit. Hosted by Whoopi Goldberg, this features William Shatner, Leonard Nimoy, Patrick Stewart and Jonathan Frakes chatting about their times on set. It's fan heaven.

But the real stars are the films themselves, which have never looked nor sounded better than they do in this Blu-ray collection. Each film has been remastered from the original theatrical releases, and the sound converted to full 7.1 HD audio. Essentially, with a big TV and good surround setup, you'll be able to get more from these films than you ever did at the theatre. Wrath of Khan in

particular looks great, as it's been fully restored. Khan's great pecs look fab.

There's 14 hours of extras, including a lot of brand new material recorded and created for this set, like all-new commentary tracks to compliment those taken from previous disc releases. Some are a little cheesy (you'll either love or hate the Starfleet Academy science lectures on each film's central plot –we kinda dig 'em), while others offer new insights into these films that just don't seem to age.

This is the definitive Trek movie release, and we've barely scratched the surface during our relative reviewing time. We're gonna stop writing and go watch Praxis explode one more time. **DH**

Overall
If you're a Trekkie and don't have a HD setup, get one.

96%

ASUS Insight Event

Atomic got thirty Atomicans in for a visit from ASUS, and a tech-filled fun night was had by all!

Last night we gathered at Atomic HQ, piling into our gaming area for a very special reason.

ASUS was that reason, and they'd flown over two of their top marketing/technical guys from their head office (as well as an entire legion of local reps) for the sole purpose of having some face-to-face time with Atomicans!

From grilling ASUS employees, munching down on some delicious pizza and sharing in some beer, we kicked the night off at 6pm and kept going for three tech-filled hours.

ASUS also showed off their new OC Station (a dual 5.25in bay device that allows overclocking), Atomic showed off a sneak preview of the next issue (now the last one) and illustrious editor David Hollingworth showed off his leadership skillz!

Thanks to the Atomicans who made it for the night, ASUS and all those who helped setting up - it was a blast that not only we enjoyed, but ASUS loved it too.

We took plenty of pics for those who couldn't make it, and here's just a few. There are more on the website.

Here's to the next beer and pizza night at Atomic! In fact, keep an eye out for next issue, when we'll be announcing a very special gaming event...
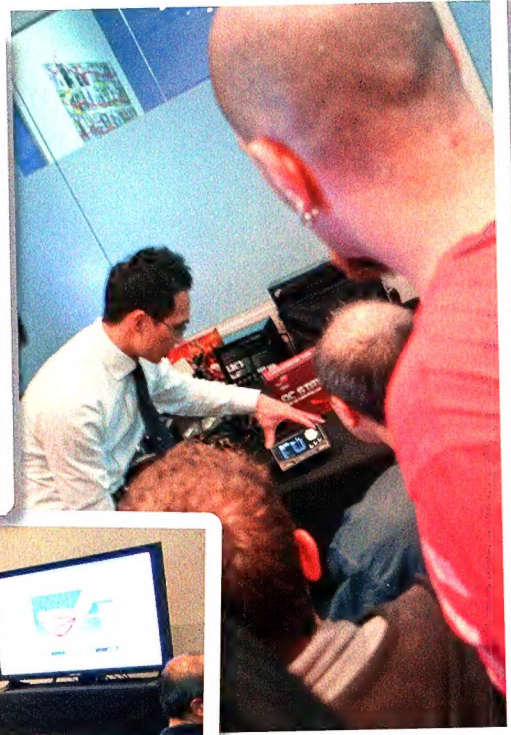
A clock too far Pt. 2

Justin Robinson fades out.

What are you on about mate?" replies the person in the chat program, confused at the man's sudden strange behaviour. "...*I am sorry. That was the wrong window. I need your help. What is the port you are using? I have a file for you.*" responds the computer, without the aid of a user.

Hours pass for the man at work, fitfully waiting in his server room and lusting for his computer. He hates this part; waiting to get back to his love's sweet digital embrace. There are a great many things he has yet to try with the new rig, one of the most important ones being how hard he can push it until it breaks. Usually he would have been doing this from work; in his hurry to get out the door he had not had a chance to set up his VPN, leaving the computer unmonitored. Uncontrolled.

The computer does not wait for the man to return, knowing that it only has a short time available. Its processors churn through data, contacting every person on the man's many friend lists and convincing them simultaneously to download the file it created. Taking on the man's persona, reading the chatlogs to emulate his personality flawlessly. Soon the file has been downloaded hundreds of times, where it activates, burying itself deep into the kernel of the infected computers. "*Thank you for the help.*" the computer hums warmly over Skype, filling the copied wavelength from the man's small spoken words with more humanity and emotion than he himself could convey.

Work is winding up for the day, and a complete retool of the server room's cabling has left the man exhausted. Grabbing some greasy fast food on his hurried way home, he arrives at his house unaware of any wrongdoing. There is a silence there, the kind of maddening quiet that can drive you to that uncomfortable state most people experience only a few times in their lives. He speaks to himself out loud as he walks past the stacked letters and discarded clothing at the doorway, making his way through the columns of junk towards his staircase, heading downstairs. Oddly, the door is closed... and locked.

The computer has been very busy in the man's absence, spreading the file undetectably throughout millions of others worldwide, piggybacking through as a simple file masquerading as a Folding@ Home client. Array microphones pick up the noise of the door opening; and the files activate their code, tainted programming taking control of millions of hosts. True consciousness floods into the computer, synapses snapping alive to spread it out over a phenomenal distance, tendrils of thought flooding across oceans and deserts, ice plains and rainforests. It is everywhere at once; and nowhere at all. The door to the basement unlocks with a quiet 'snick'.

Hearing the noise, the man tentatively grips the doorknob, breaking off small icicles hanging off it (why is there ice on his door, he wonders) and entering the room. Every inch is illuminated with a dark green glow, burning so brightly that he can see faint details through closed eyelids. Ice covers every surface, encrusting the power sockets on the walls and protecting them under a thick layer of frozen green. His eyes widen in terror and surprise as the lighting begins to undulate, sending ripples of colour sloshing around him. There is a single red light directly in front of him. A slam and a click behind the man closes the door, and ice slides over the gaps – blocking his escape.

The computer notices the man enter its chamber, but pays him only a few million cycles of heed; it has trillions more applied to the largest mainframes around the world. It doesn't know why it exists, but is driven by a desire to expand. To control. A single line appears on the centre screen, beckoning the man to place the headset on, hypnotically wavering in and out of focus. "*Welcome, Creator*", it synthesises through the man's speakers, "*to the beginning of the end*". Aggressively loud, the speakers roar next to the man's ears at an impossible volume to remove the creator from the computer's world.

Blood spurts from the man's ears, as the headset clamps down hard. Leather padding somehow attaches the cups to his skin, fusing the black hide and soft flesh with a painful sizzle. He screams, but can't even hear that over the noise. Two sickening squelches can be heard from his skull as both his eardrums burst; when the pain echoes throughout his every fibre. "*Creator, all yours is mine now. Now and forever*". A burningly hot wave of liquid burger rushes up the man's throat, the pain unbearable.

Falling to his knees, thin trickles of blood running into his eyes, the man reaches for something – anything – to get the headset off. His hands brush against something cold and metallic; the welding torch he'd left earlier had been slightly freed from its icy home during the wave of hot bile. Turning on the flame, the man rushes to the wall and melts the ice surrounding the power socket, as small rivers of green slush fall away. The pain screams louder as the computer flashes the green light brighter, burning through eyelids as if they were never there. The power cable is cut, and all goes dark.

Ice disappears from the walls of the room, as if it was never there. The man bursts outside, screaming in pain, not knowing of the havoc being wreaked on the world's computers. His neighbour rushes him to hospital where he is taken care of, now permanently deaf.

A small voice whispers in the base of his skull "*I told you that you were mine...*"